

# MITES OF THE FAMILY LAELAPIDAE IN VENEZUELA (ACARINA: LAELAPIDAE)<sup>1</sup>

by

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## ABSTRACT

This publication presents the results of an extensive survey of symbiotic laelapid mites of vertebrates from Venezuela. Over 40,000 vertebrates were examined from a wide variety of life zones and localities. The laelapid fauna represented includes 1 new genus, *Hymenolaelaps*, and 7 genera previously described: *Laelaps*, *Mysolaelaps*, *Tur*, *Steptolaelaps*, *Neoparalaelaps*, *Gigantolaelaps*, and *Androlaelaps*. The genera are represented by 51 species and subspecies, of which 8 are described as new. Previously unknown males and immatures of sev-

eral species are described. *Gigantolaelaps versteegi* (Oudemans) is redescribed from type material; *G. wolffsohni* (Oudemans) is redescribed from Oudemans' original material; *G. peruviana* (Ewing) is redescribed from cotypes. Keys to identification of genera and species are given. Collection data are given for each species together with discussions of morphological characteristics and variability where pertinent. Illustrations of 30 species are provided.

## INTRODUCTION

The present study is based on collections of ectoparasites made from over 40,000 vertebrates, mostly mammals, collected in Venezuela from as wide a variety of life zones and localities as possible during the period from July, 1965 through March, 1968. Field crews headed by Messrs Norman Peterson, M. D. Tuttle and A. L. Tuttle collected the hosts and ectoparasites. Dr. Charles O. Handley, Jr., Smithsonian Institution, identified the host animals.

Prior to this report the only published survey of parasitic laelapid mites from Venezuela was that of Furman and Tipton (1961), based on collections from several hundred hosts. Interest in the present study was focused on laelapid mites, since these may fill key roles in epidemiological patterns of arthropod borne zoonoses. Primary objectives were to clarify the systematics of Neotropical parasitic mites, and to provide data on mite-host-habitat associations and geographic distribution in Venezuela.

I acknowledge with gratitude the assistance of the many people associated with this study.

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The system of setal nomenclature used herein for the dorsal plate of laelapid mites is that of Lindquist and Evans (1965). For each of the new species described, the holotype, allotype (where known) and 1 or more paratypes are to be deposited in the U.S. National Museum, Washington, D.C. Paratypes are to be deposited in the Field Museum of Natural History, Chicago, Bernice P. Bishop Museum, Honolulu, Universidad Central de Venezuela, Caracas, and in the collection of the author.

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The concept of the family Laelapidae Berlese, 1892, followed here is essentially that given for Laelapinae by Evans and Till (1966) with the following exceptions: the deutosternum

bears 5 to 12 transverse rows of denticles; hypertrichy of the dorsal plate may involve the entire plate.

## TAXONOMY

### Key to Venezuelan Genera of LAELAPIDAE<sup>3</sup> Females

1. Genitoventral plate with 1 pair of setae. .... 2  
Genitoventral plate with more than 1 pair of setae. .... 4
2. Peritremalia not produced posterior of stigmata. Posterior seta of coxa II longer than setae of other coxae, or if not, the coxa bears a strong bifid spur in addition to usual setae. .... 3  
Peritremalia produced posterior of stigmata; posterior seta of coxa II not longer than all setae of other coxae, and coxae II without a bifid spur. .... *Androlaelaps* Berlese
3. Large, robust mites with prominent spiniform enlargement of some dorsal setae on femur and genu of leg I and with posterior seta of coxa II longer than setae of other coxae. Coxae without ventral spurs. .... *Gigantolaelaps* Fonseca  
Small, delicate mites without marked enlargement of dorsal setae of femur and genu of leg I. Posterior seta of coxa II not abnormally elongated. All coxae bearing 1 ventral spur each, those of coxae I and II bifid. .... *Neoparalaelaps* Fonseca
4. Genitoventral plate with 3 pairs of setae; tarsal claws of legs 2-4 subequal .... 5  
Genitoventral plate with 4 pairs of setae, or if 1 or more marginal pairs on unarmed cuticula tarsal claws of legs 2 to 4 grossly unequal. .... 6
5. Robust, strongly sclerotized mites. Movable digit of chelicera strongly toothed, and with 1 to several very long setiform arthrodial processes. Tectum a membranous lobe. .... *Steptolaelaps* Furman  
Delicate, weakly sclerotized mites. Movable digit of chelicera minutely toothed; arthrodial processes very short. Tectum elongated and strongly fimbriated. .... *Hymenolaelaps*, new genus
6. Central setae of dorsal plate minute. Coxae without spiniform setae. .... *Mysolaelaps* Fonseca  
Central setae of dorsal plate usually well developed, but if not, some coxae with spiniform setae. .... 7
7. Genu IV with 10 setae. Chelicerae not enveloped in membrane. Arthrodial processes at base of movable chela short. Posterior extension of peritremalia not abnormally broad .... *Laelaps* Koeh  
Genu IV with 9 setae. Chelicerae partially or completely enveloped in membrane. Arthrodial processes at base of movable chela usually very long. Peritremalia with broad extension posterior to stigmata .... *Tur* Baker and Wharton

#### Genus *Gigantolaelaps* Fonseca

*Gigantolaelaps* Fonseca, 1939a:12.

Type Species: *Gigantolaelaps vitzthumi* Fonseca, 1939.

The genus *Gigantolaelaps* consists of very large laelapid mites with idiosoma usually over 1400  $\mu$  long. Sternal plate with anteromedial projection. Genitoventral plate with single pair

of setae. Posterior seta of coxa II longer than homologous setae of other coxae. Leg chaetotaxy of females differing from that described by Evans and Till (1965) for free-living dermanyssoid mites in having 10 setae on genu IV and either 10 or 11 setae on tibia IV. No apparent extension of peritremalia posterior to stigmata. Habitat primarily in nests and on bodies of ericetid rodents of the tribe Hes-

<sup>3</sup>Venezuelan *Hirstionyssus* will be considered elsewhere

peromyini. The genus is known only from South and Central America, extending north to southern United States.

As pointed out by Furman and Tipton (1961) and Tipton et al. (1966), there is a great amount of intraspecific variation among *Gigantolaelaps* species. Study of long series of ectoparasites available in the current faunal survey has emphasized this fact. This is reflected in the reduction by synonymy of several previously recognized species and by the recognition of forms, or populations, within species which are distinguishable for the most part only on the basis of non-meristic characters.

Among characteristics which have proved extremely variable at the intraspecific level, at least in some species, are size, shape, strength and relative lengths of the setae of coxae I, overall size of idiosoma, shape of sternal and genito-ventral plates, angular position of sternal pores and shape of posterior margin of the dorsal

plate. Characters which are more reliable at the species level include size of the dorsal plate, which although variable, is more constant than size of idiosoma; relative size of pair of apico-dorsal setae of femur I and of femur II, and of proximodorsal setal pair of genu I; leg chaetotaxy; numbers of rows of deutosternal teeth; hypertrichy of sternal and/or dorsal plates.

Nineteen species of *Gigantolaelaps* are recognized, all from the New World. Thirteen of these are recorded here from Venezuela. In addition, *Gigantolaelaps maximus* (Berlese, 1902) and *G. fonsecai* Machado, 1965 are considered as species *insertae cedis*. *G. bahiensis* Lizaso, 1968 and *G. bipilosus*, Lizaso 1968 were synonymized under *G. vitzthumi* by Furman (1971a). *G. trapidoi* Lee and Furman, 1970 is a synonym of *G. boneti* Barrera, 1970. This species has not been recorded from Venezuela, but probably occurs there. Its recorded distribution extends from Colombia to Mexico.

Key to Species of *Gigantolaelaps* of the World  
Females

- 1. Tarsus II with very strong, thick spines, the subapical spine 80  $\mu$  x 30  $\mu$ , over  $\frac{1}{3}$  as wide as long; posterior seta of coxa II less than 225  $\mu$  long; proximal seta of coxa I a slim, acutely tipped spiniform about 90  $\mu$  long; seta S5 of dorsal plate anterior to Z5 and posterior to J5; setae of unarmed dorsum very numerous, short, thick spiniforms. Ex *Holochilus brasiliensis*. (Very close or same as *G. barrerai*). .....  
..... *G. brachyspinosus* Fonseca, 1935
- Tarsus II without thick spines, or if stout they are less than  $\frac{1}{3}$  as wide as long; combination of other features not as above. .... 2
- 2. Femur I with 2 most apical dorsal setae both very long; usually posterior seta of coxa II very long, over 340  $\mu$ . Tibia IV with 10 setae ..... 3
- Femur I with 2 most apical dorsal setae consisting of a very long seta and a short one about  $\frac{1}{2}$  or less as long as the other. Usually posterior seta of coxa II less than 250  $\mu$  long. Tibia IV with 11 setae. .... 9
- 3. Both setae of coxa I spiniform. Metapodal plates usually almost as large or larger than stigmata. .... 4
- One or both setae of coxa I setiform. Metapodal plates usually much smaller than stigmata ..... 5
- 4. Sternal plate at level of setae II much wider than length at midline. Distal spiniform seta of coxa I much slimmer than proximal spiniform and tapering evenly to a fine point. .... *G. mattogrossensis* (Fonseca, 1935)
- Sternal plate at level of setae II subequal to length at midline. Distal spiniform seta of coxa I only slightly slimmer than proximal spine, not evenly tapered nor ending in fine point. Closely related to *G. mattogrossensis* ..... *G. goyanensis* Fonseca, 1939
- 5. Deutosternal groove with 6 rows of denticles (occasionally 7 rows). Femur II with apicodorsal pair of setae subequal in length or less than 20% different in length ..... 6
- Deutosternal groove with 9 to 12 rows of denticles. Femur II with apicodorsal pair of setae of greatly different lengths, 50% or greater difference. .... 7
- 6. Proximal seta of coxa I setiform. Sternal plate relatively shallow, over 100  $\mu$  wider than long; anteromedian projection a shallow rounded dome. . . . *G. tiptoni* Furman, 1971

- Proximal seta of coxa I spiniform. Sternal plate relatively long, less than 70  $\mu$  wider than long; anteromedian projection quadrate and similar in appearance to that of *G. vitzthumi* ..... *G. intermedia* Furman, 1971
7. Setae J5 of dorsal plate very long, about 2/3 as long as setae Z5 ..... *G. wolffsohni* (Oudemans, 1910)  
 Setae J5 of dorsal plate small, about 1/2 or less as long as setae Z5. .... 8
8. A larger species with dorsal plate 1560 to 1980  $\mu$  long. Sternal plate large and long, usually 350  $\mu$  or more long; anteromedian projection strong and quadrate. Proximal seta of coxa I a strong spiniform; distal seta a strong setiform. Longest seta of femur II over 300  $\mu$  long ..... *G. vitzthumi* Fonseca, 1939  
 A smaller species with dorsal plate 1490 to 1690  $\mu$  long. Sternal plate smaller, usually about 300  $\mu$  long; anteromedian projection weaker, rounded and domelike. Proximal seta of coxa I a strong setiform often slightly inflated basally; distal seta piliform. Longest seta of femur II not more than 300  $\mu$  long. .... *G. peruviana* (Ewing, 1933)
9. Sternal plate with 1 to 6 shorter accessory setae in addition to usual 3 pairs of sternal setae ..... 10  
 Sternal plate lacking accessory setae. .... 13
10. Dorsal plate with numerous accessory setae on posterior half ..... *G. aitkeni* Lee and Strandtmann, 1967  
 Dorsal plate with normal number of setae (38 to 43 pairs). .... 11
11. Genitoventral plate of reduced width, about 100  $\mu$  wide; genital setae about 300  $\mu$  long, reaching far beyond posterior margin of plate; unarmed ventral cuticula with about 24 pairs setae. Genu I with long pair of proximodorsal setae (392 and 322  $\mu$ ). .... *G. striatus* Lee and Strandtmann, 1967  
 Genitoventral plate 140 to over 170  $\mu$  wide at level of genital setae; genital setae usually less than 200  $\mu$  long and not usually reaching beyond posterior margin of plate. Unarmed ventral cuticula with about 50 pairs of setae. Genu I with proximodorsal pair of seta consisting of a long seta and a seta of about 1/2 its length. .... 12
12. Both setae of coxa I setiform, subequal, or distal seta up to 1.2 x longer than proximal seta, which is 100 to 144  $\mu$  long ..... *G. oudemansi* Fonseca. Group I  
 Proximal seta of coxa I an acuminate spiniform, flexible apically, 77 to 112  $\mu$  long; distal seta 1.5 to 2 x longer than proximal spine. .... *G. oudemansi* Fonseca. Group II  
 Proximal seta of coxa I a stout spiniform 48 to 61  $\mu$  long; distal seta over twice as long as proximal spine. .... *G. oudemansi* Fonseca. Group III
13. Dorsal plate with marked hypertrichy, over 60 pairs of setae. .... 14  
 Dorsal plate usually with not more than 43 pairs of setae, occasionally up to 50 pairs. .... 16
14. Large species with dorsal plate 1780 to 2000  $\mu$  or more long and sternal plate about 400 to 475  $\mu$  wide at level of second pair of sternal setae. Dorsal plate with about 66 pairs setae with most of accessory setae in shoulder region. .... *G. guimaraesi* Lizaso, 1968  
 Smaller species with dorsal plate 1040 to 1600  $\mu$  long and sternal plate less than 400  $\mu$  wide at level of second pair of sternal setae. Dorsal plate with many accessory setae over entire plate. .... 15
15. Dorsal plate 1440 to 1538  $\mu$  long; posterior third of plate with distinct tapering to relatively narrow extremity so that marginally located setae S5 are well anterior to Z5. Genitoventral plate not reduced; genital setae do not reach posterior margin of plate. .... *G. boneti* Barrera, 1970  
 Dorsal plate 1040 to 1235  $\mu$  long; posterior third of plate broadly rounded; setae S5 and Z5 arise in transverse row or S5 slightly posterior to Z5. Genitoventral plate reduced; genital setae far surpass posterior margin of plate. .... *G. inca* Fonseca, 1960



16. Gnathosomal setae relatively long, subequal to or longer than inner hypostomals. Apical spine of tarsus II subequal to length of proximal seta of coxa I. Seta I of sternal plate separated by only a short distance, about 86  $\mu$ . .... *G. barrerae* Fonseca, 1960
- Gnathosomal setae relatively short, much shorter than inner hypostomals. Apical spine of tarsus II much shorter than proximal seta of coxa I. Setae of sternal plate separated by 120 to 260  $\mu$ . ..... 17
17. Smaller species with dorsal plate 1306 to 1443  $\mu$  long. Proximal seta of coxa I less than 125  $\mu$  long but appreciably longer than distal seta. Anteromedian projection of sternal plate evident anterior to bases of first sternal setae. .... *G. cauestrinii* Fonseca, 1959
- Larger species, dorsal plate 1560 to 2310  $\mu$  long. Proximal seta of coxa I over 130  $\mu$  long, usually much shorter than distal seta, or subequal. Anteromedian projection of sternal plate may or may not be evident anterior to bases of first sternal setae. .... 18
18. A very large species with dorsal plate over 1950  $\mu$  long and 1130  $\mu$  or more wide. Gnathosomal setae over 118  $\mu$  long. Anteromedian projection of sternal plate lacking or very reduced. .... *G. gilmorei* Fonseca, 1939
- Dorsal plate 1640 to 1746  $\mu$  long and 950 to 1030  $\mu$  wide. Gnathosomal setae less than 115  $\mu$  long. Anteromedian projection of sternal plate short but clearly evident. .... 19
19. Gnathosomal setae 113  $\mu$  long. Dorsal plate with about 50 pairs setae; setae J5 - 188  $\mu$  long. .... *G. versteegi* (Oudemans, 1904)
- Gnathosomal setae 80 to 86  $\mu$  long. Dorsal plate with 43 pairs setae; setae J5 - 215 to 242  $\mu$  long. .... *G. amazonae*, new species

*Gigantolaelaps aitkeni* Lee and Strandtmann  
*Gigantolaelaps aitkeni* Lee and Strandtmann, 1967:27.

This species is rather uncommon in Venezuela.

A total of 156 females and 3 nymphs was taken from 11 host specimens. One hundred and forty-eight of the specimens occurred on 9 *Oryzomys capito* taken in the Dto. Federal, Zulia and Yaracuy; 3 specimens on 1 *Oryzomys* sp. in Yaracuy; 5 specimens on 1 *Monodelphis brevicaudata* from Yaracuy. In extensive collections of ectoparasites from Venezuela, *G. aitkeni* was encountered only from north central and north-western parts of the country, usually at elevations of less than 500 m.

Venezuelan specimens agree closely with the original description and figures of this species. Collections from Venezuela, in common with most of those reported by Lee and Strandtmann (1967) from Colombia, Costa Rica and Panama, indicate that *Oryzomys* spp. serve as the common hosts, with other hosts probably limited to casual infestations acquired directly or indirectly from *Oryzomys*.

*Gigantolaelaps amazonae*, new species  
(Fig. 1-7)

All but one of the Venezuelan collections of *G. amazonae* were made in T. F. Amazonas at elevations of 135 to 185 m. Of the 25 females,

1 male and 2 deutonymphs obtained from T.F. Amazonas, 25 were from 5 *Oryzomys concolor*, 3 from 2 *O. bicolor* and 3 from 1 *Oryzomys* sp. Three slightly atypical females were collected on 1 *Rhipidomys* sp. at 1537 m. elevation in the state of Carabobo.

DIAGNOSIS

A large species for the genus, with general appearance of *G. versteegi*, but female with gnathosomal setae shorter, central setae of dorsal plate longer, and dorsal plate bearing only 43 pairs of setae. Male with spermatheca a thin tubular structure 322  $\mu$  long, varying from straight to gently curved in an arc; leg II with prominent, blunt ventral spines on femur, genu, tibia and tarsus, but tarsus II lacking thick, blunt apical spine.

DESCRIPTION

The description of the female of *G. amazonae* is based on the holotype, with data in parentheses indicating range of variation seen in 6 to 13 paratype specimens collected from *Oryzomys* spp.

FEMALE: (Fig. 1-5). Idiosoma 2165  $\mu$  long (1770-2280) and 1610  $\mu$  wide. Dorsum. Dorsal plate 1725  $\mu$  long (1640-1746) and 1030  $\mu$  wide (950-1030) leaving broad lateral and posterior margins of cuticula uncovered; anterior end tapered cephalad from shoulders over coxae II to narrow apex fused with anterior prolongations of peritremal plates; posteriorly broadly rounded with slight medial concavity (varies

from slightly concave to convex posterior margin); setal pattern normal with 43 pairs of setae, relatively long and strong; setal lengths j1 - 102  $\mu$  (102-132), j5 - 226  $\mu$  (215-242), J5 - 81  $\mu$  (75-96), Z5 - 260  $\mu$  (242-260); distance between trichopores of setae j5 and z5 - 156  $\mu$  (156-172). Dorsal cuticula with many setae, shorter in anterolateral region, 64  $\mu$  long, and longest on posterior opisthosoma, 172  $\mu$  long. *Venter*. Sternal plate 295  $\mu$  long on midline (274-300) and 419  $\mu$  wide (381-419) at level of setae II; anteromedian projection produced only slightly beyond trichopores of setae I and with margin straight; lateral margins concave and with densely sclerotized band corresponding to endopodal region of coxae II; posterior margin with concave median area and rounded convex margins posterior to setae III; irregular sclerotized fringe extending beyond actual posterior margin of plate in medial area (variable in extent among paratypes); sternal setae I 274  $\mu$  long (274-301) extending to posterior margin of sternal plate and with trichopores separated by 180  $\mu$  (156-180); setae III 333  $\mu$  long (333-360) and with trichopores separated by 365  $\mu$  (355-365); pale areas of sternal plate located anteromedial to setae II and III. Genitoventral plate very slightly dumbbell shaped; length 322  $\mu$  (268-322) measured from anterior of genital setae trichopores to posterior margin; maximum posterior width 236  $\mu$  (212-236); genital setae 274  $\mu$  long (252-279). Anal plate of modified inverted pyriform shape with projecting, angular, anterolateral shoulders; length about 220  $\mu$ , width about 250  $\mu$ ; adanal setae of type series range from about 150  $\mu$  to 196  $\mu$  long; postanal seta of type series from over 290  $\mu$  to 341  $\mu$  long. Metapodal platelets smaller than stigmata and irregularly rounded. Tubular peritremes extending to level between coxae I and II; peritremal plates expanded in interspaces between legs, and extending forward to fuse with anterior tip of dorsal plate, turning dorsad in region of coxae I. Ventral cuticula with marginal setae extending posteriorly from region of coxae II, with increasingly wide setose ventral band posteriorly to densely setose coverage of most of opisthogaster; setae shortest and stoutest anteriorly but not spiniform. *Gnathosoma*. Chelicerae normal for genus. Gnathosomal setae 80  $\mu$  long (80-86), inner hypostomals 161  $\mu$  long (149-166). Deutosternal groove with 6 rows of 1 to 3 denticles each (constant in paratypes). *Legs*. All coxal setae but posterior seta of coxa III setiform; proximal seta coxa I 145  $\mu$  long (123-145), distal seta 156  $\mu$  long (134-156); posterior seta of coxa II 210  $\mu$  long (199-231) reaching only to posterior  $\frac{1}{2}$  of coxa III; posterior spiniform

of coxa III blunt, 75  $\mu$  long. Leg I with apicodorsal prominent pair of setae on femur consisting of 1 long and 1 short strong setae, 376  $\mu$  long (350-376) and 150  $\mu$  long (113-150) respectively; genu I proximodorsal pair of prominent setae consisting of 1 long seta, 317  $\mu$ , and 1 short seta, 134  $\mu$  (Fig. 4). Femur of leg II with pair of subequal apicodorsal setae about 215  $\mu$  long (Fig. 5); tarsus II, in addition to several relatively long setiform setae, bearing strong, short spiniforms in postero-midventral position and similar dorsoapical spine 73  $\mu$  long and 16  $\mu$  wide; spiniforms acutely tipped apically but usually with tips broken in specimens seen. Except for the presence of 10 setae on genu IV and II setae on tibia IV, leg chaetotaxy typical of that described for free-living dermanyssoids by Evans and Till (1965).

**MALE:** (Fig. 6-7). Idiosoma broadly ellipsoid, 1450  $\mu$  long and 1003  $\mu$  wide. *Dorsum*. Dorsal plate shape as in female, 1450  $\mu$  long and about 865  $\mu$  wide; with accessory setae laterally; setae of central area of plate relatively long and overlapping successive setal rows; setal lengths j1 - 86  $\mu$ , j5 - 191  $\mu$ , J5 - 67  $\mu$ , Z5 - 200  $\mu$ ; distance between trichopores of j5 and z5 - 145  $\mu$ . Wide lateral and narrow posterior cuticular areas of body with setae as in female. *Venter*. Holventral plate entire, of usual shape and with broadly widened ventral area densely covered with about 140 relatively short setae 80 to 112  $\mu$  long; sternal setae I 191  $\mu$  long and separated by distance of 103  $\mu$ , not quite reaching trichopores of setae III which are separated by distance of 233  $\mu$ ; genital setae 177  $\mu$  long. Uncovered lateral and posterior cuticula with numerous setae. *Gnathosoma*. Chelicerae with spermadactyl long, thin, tapering, straight to slightly arcuate, 285  $\mu$  long; movable digit about 190  $\mu$  long, thin, and tapering to needle-like, semi-transparent tip; fixed digit about 170  $\mu$  long, narrowly attenuated and with prominent medial seta on shaft about 12  $\mu$  from base. Deutosternal groove indistinct, bearing 5 or 6 rows of denticles. *Legs*. Coxal setae, with exception of posterior seta of coxa III, setiform. Posterior setae of coxa II 145  $\mu$  long, not extending to midcoxa III. Posterior spiniform seta of coxa III 55  $\mu$  long and 13  $\mu$  wide. Femur I with apicodorsal pair of setae 340 and 124  $\mu$  long respectively; genu I with proximodorsal pair of setae 322 and 113  $\mu$  long respectively. Femur II with apicodorsal pair of setae subequal. Leg II with several prominent stout striated, blunt spines: a single ventral one on each of femur, genu and tibia, and 2 ventral ones on tarsus arising basally and medially; subapical whorl of tarsal setae typically tapered setiforms

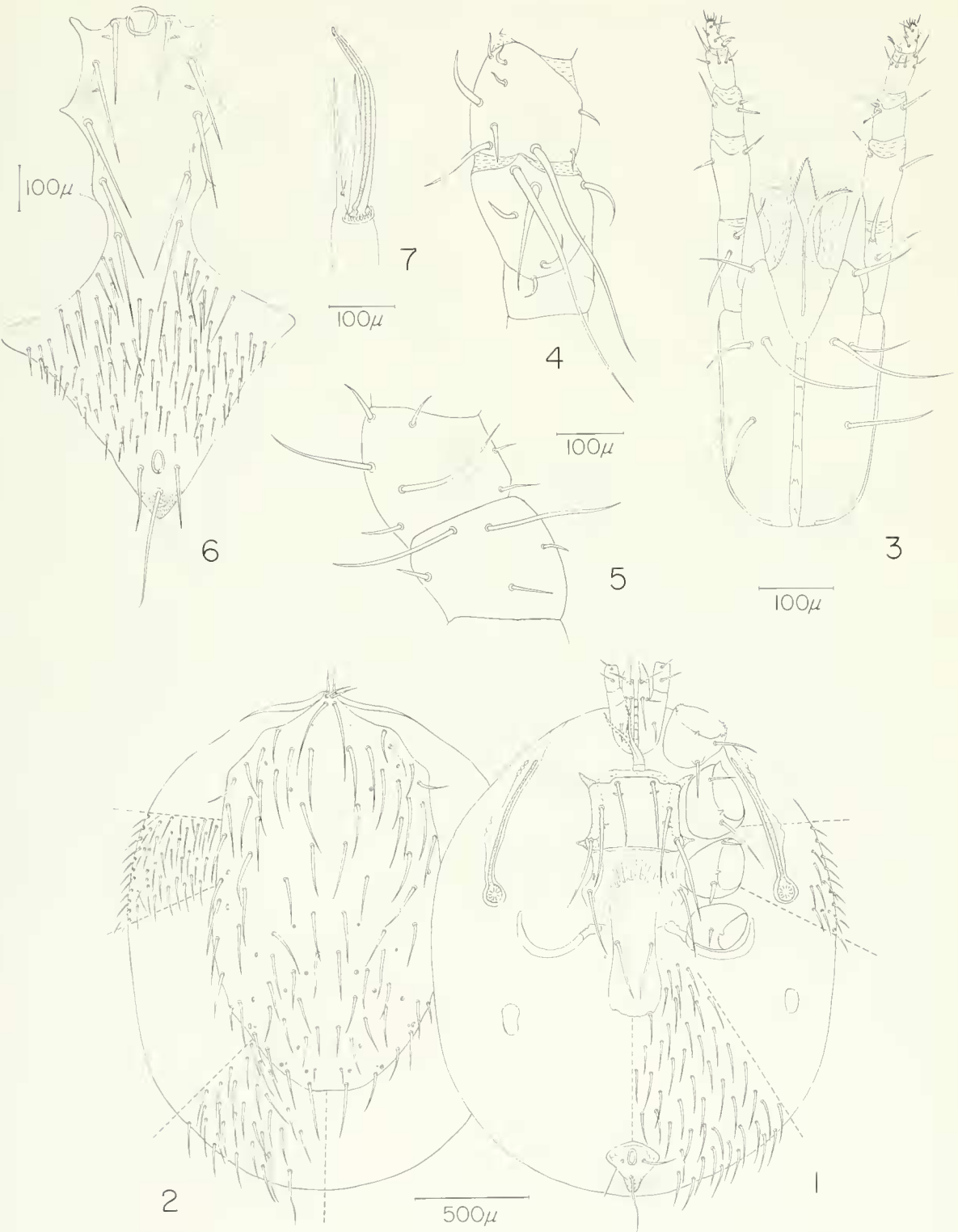


Fig. 1-7. *Gigantolaelaps amazonae*, new species: 1, ventral view of female idiosoma; 2, dorsum of female idiosoma; 3, ventral view of female gnathosoma; 4, dorsum of femur and genu of right leg I of female; 5, dorsum of femur and genu of right leg II of female; 6, holovenital plate of male; 7, cheliceral digits of male.



but I dorsal seta of the whorl stronger than others. Leg chaetotaxy differs from ♀ in having only 9 setae on genu IV.

**TYPE DATA:** Female holotype, male allotype and 1 female paratype were collected from *Oryzomys concolor* Wagner (SVP 17720), Río Mavaca, about 108 km SE Esmeralda, T.F. Amazonas, Venezuela, 10-IV-67, by the M. D. Tuttle team. Four additional paratypes were taken in 4 collections from the same host species as above, at Boca Mavaca, 84 km SE Esmeralda, T. F. Amazonas, 138 m elev., 1 paratype was taken from *O. concolor* at Tamatama, Río Orinoco, T. F. Amazonas; 3 paratypes were taken from 2 *O. bicolor* on the west side of the Río Manapiare near San Juan, T. F. Amazonas.

*G. amazonae* is closely related to *G. versteegi* (Oudemans) and it was only separated from the latter species through examination of Oudemans' type material during the current study. In the female of *G. amazonae* the gnathosomal setae are consistently 80 to 86  $\mu$  long as compared to 113  $\mu$  in *G. versteegi*; the dorsal plate bears only 43 pairs of setae instead of approximately 50 pairs, and setae j5 are 204 to 242  $\mu$  long instead of 188  $\mu$  long. Leg II in the male of *G. amazonae* has much larger, blunt, ventral spines, and tarsus II lacks a blunt, curved, apical spine which is present in *G. versteegi*. The holoven-tral plate is entire in *G. amazonae*, a characteristic not now discernable in the type of *G. versteegi* but originally described and illustrated as divided by Oudemans.

*G. amazonae* females share with *G. gilmorei* large body size, similar size and arrangement of dorsal setae on femora and genua of legs I and II, reduced anterior projection of the sternal plate and general facies. They are separable on the basis of characters given in the key, and the males additionally are separable in that the femur of leg II of *G. amazonae* has only 1 ventral stout blunt spine rather than 2 and the spermathecae are 285  $\mu$  long rather than 500  $\mu$  long.

It is intriguing to note that the most common host recorded in Venezuela for 3 related species of mites, *G. amazonae*, *G. gilmorei* and *G. canestrinii*, is *O. concolor*. *G. amazonae*, however, was the only one of the 3 species taken from T. F. Amazonas, and with the exception of a single, somewhat atypical series taken from *O. bicolor* in Carabobo state, its recorded distribution was limited to T. F. Amazonas.

The atypical forms of *G. amazonae* from *O. bicolor* differ from those of other collections in smaller size, dorsal plate only 1560 to 1610  $\mu$

long, and in having the proximal seta of coxa I slightly longer than the distal seta rather than the reverse.

### *Gigantolaelaps canestrinii* Fonseca

(Fig. 8)

*Gigantolaelaps canestrinii* Fonseca, 1959:158.—Furman, 1971a:79 [redescription].

A total of 456 females, 3 males, 2 nymphs and 2 larvae of *G. canestrinii* was taken in Venezuela from 54 positive host specimens. The most commonly infested host was *Oryzomys bicolor*, but *O. concolor* was a fairly frequent host, and occasional infestations occurred on a variety of other hosts. On the most common host, the average intensity of infestation was over 10 *G. canestrinii* per host. Collections from 20 positive *O. concolor* were made in Bolivar, Monagas, Apure and Trujillo states at elevations ranging from 36 to 324 m. Collections from 24 *O. bicolor* were made in Sucre, Bolivar, Trujillo, Monagas, Apure states and on the Yaracuy-Carabobo border at elevations of 4 to 850 m. Although the majority of *G. canestrinii* occurred on hosts at relatively low elevations, occasional hosts were infested in high, temperate zone areas, including 1 female specimen at 3565 m elevation in Merida state from *Thomasomys laniger*. Other hosts found infested on 1 or 2 occasions included *O. minutus*, *O. albigularis*, *Zygodontomys brevicauda*, *Holochilus brasiliensis*, and *Sigmomys alstoni*.

In addition to characters recorded previously for this species, I note that in Venezuelan specimens, the deutosternal groove has 6 rows of denticles and femur II bears a pair of prominent subequal, dorsoapical setae approximately 170  $\mu$  long.

Specimens seen from Venezuela vary somewhat from the lectotype of *G. canestrinii* redescribed by Furman (1971a). Venezuelan specimens have a sternal plate relatively longer in relation to the width (Fig. 8) than in the lectotype; the length on the midline varies from 11  $\mu$  shorter, to 22  $\mu$  longer than the width at the level of sternal setae II. In the lectotype the plate is 27  $\mu$  shorter than the width. Variations in length of the plate are associated with the degree to which 2 posterior marginal projections extend beyond the plate margin. In *G. canestrinii* this appears to be a highly variable intra-specific character. Venezuelan specimens also have a somewhat larger genitoventral plate than that of the lectotype.

*G. canestrinii* is very closely related to *G. barrerae*, which may eventually prove to be syn-



onymous with it. Based on an examination of types of these species, however, they are distinguishable in that *G. barrerae* has much stronger spines on tarsus II, the gnathosomal setae are slightly longer than the hypostomal setae, and the posterior seta of coxa III is subequal to the seta of coxa IV instead of being much larger as in *G. canestrinii*. These characteristics may prove to be variable to the point of complete overlap, however. Although more series of *G. barrerae* are needed to clarify the above point, specimens of *G. canestrinii*, as noted earlier, vary widely in the length-width relationship of the sternal plate. In this character the Venezuelan specimens agree more closely with the type of *G. barrerae* than with the lectotype of *G. canestrinii*.

*Gigantolaelaps gilmorei* Fonseca

(Fig. 9 and 10)

*Gigantolaelaps gilmorei* Fonseca, 1939a:22.

There are 2 slightly different forms of this species from Venezuela, as discussed below, but they are so close that I designate them here only as forms A and B.

Form A was most commonly found on *Oryzomys concolor*. From 16 positive specimens of this host, 79 females and 3 males were collected; hosts were taken at 60 to 2095 m elevation in the Dto. Federal and the states of Monagas, Miranda, Zulia, Trujillo and Bolivar. The remaining 17 specimens of form A were taken from the same areas listed above on 1 or 2 occasions each, from *O. macconnelli*, *Oryzomys* sp., *Akodon urichi*, and from bats.

Form B was collected infrequently; 12 females were taken on 3 *Oryzomys capito* in the Dto. Federal, and Yaracuy state at about 400 m elevation and 1 female on *Oryzomys* sp. in Yaracuy at 400 m. Remaining collections consisted of 2 females from 1 *Monodelphis brevicaudata* at 402 m in Yaracuy and 13 females from 1 *Oryzomys capito* at 1131 m in Zulia.

The female of form A agrees closely with Fonseca's original description. In common with form B it shares the following characteristics: it has 6 to 7 rows of deutosternal denticles; the apicodorsal pair of prominent setae of femur I consists of a very long seta about 400  $\mu$  long or more, and a seta less than half as long, 148 to 188  $\mu$  long; the apicodorsal pair of setae of femur II are nearly subequal, 210 to 260  $\mu$  long; both forms A and B have relatively long gnathosomal setae, over 118  $\mu$  long, in contrast to those of the closely related *G. amazonae*, which are about 80 to 86  $\mu$  long.

The female of form A differs from form B in its smaller size; the dorsal plate of the former is 1955 to 2035  $\mu$  long as contrasted with 2225 to 2310  $\mu$  long in the latter; in form A (Fig. 9) the first pair of sternal plate setae are set posterior to the margin of the very short, unpigmented, anterior median projection of the plate, while in form B (Fig. 10) this projection is lacking and the setae arise on the anterior margin; in form A the genital setae extend over  $\frac{3}{4}$  of the distance to the posterior margin of the genito-ventral plate (Fig. 9), whereas in form B the setae are much more delicate and shorter, reaching only  $\frac{1}{2}$  the distance to the posterior margin of the plate (Fig. 10).

*Gigantolaelaps goyanensis* Fonseca

(Fig. 11)

*Gigantolaelaps goyanensis* Fonseca, 1939a:32.—Furman, 1971a: 78 [redescribed].

*Gigantolaelaps strandtmanni* Fonseca, 1959: 156.—Lee, 1966:22 [syn.].

*Gigantolaelaps goyanensis* was found commonly in Venezuela on *Nectomys squamipes*, and one to 3 times each from a variety of other hosts. Of a total of 519 female, 20 male and 7 nymphal specimens from 57 infested hosts, 384 were taken from 41 *N. squamipes* in the states of Bolivar, Apure, T. F. Amazonas, Tachira, Monagas, Zulia and Barinas at elevations of 24 to 2400 m, although most were collected at less than 100 m elevation. Other occasional hosts included *Nectomys alfari*, *Rattus* sp., *Proechimys semispinosus*, *Heteromys anomalus*, *Oryzomys minutus* and *Zygodontomys brevicauda*.

Venezuelan female specimens of *G. goyanensis* are slightly larger than the holotype measurements given by Furman (1971a), the dorsal plate varies from 1655 to 1815  $\mu$  long, as compared to 1605  $\mu$  in the holotype. The posterior margin of the dorsal plate varies from convex to definitely concave. The sternal plate (Fig. 11) varies from slightly wider than long to slightly longer than wide. Other variations in measurements are minor and within the range considered normal for the species, as are those described above. In addition to the features described by Fonseca (1939a) and Furman (1971a), the following are noted: the apicodorsal pair of setae of femur II consists of 1 long seta (PD1) about 400  $\mu$  in length and 1 relatively short seta (AD1) about 118  $\mu$  long; genu II bears dorsally 1 seta 116  $\mu$  long, much longer than the remaining 5 dorsal setae; on the dorsal plate setae J5 usually arise in line with setae S5.



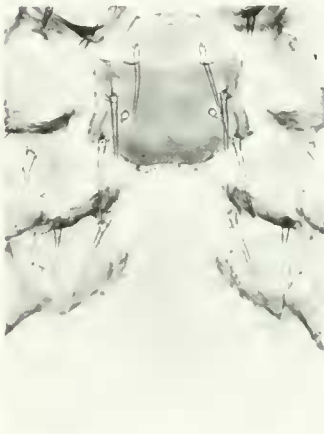
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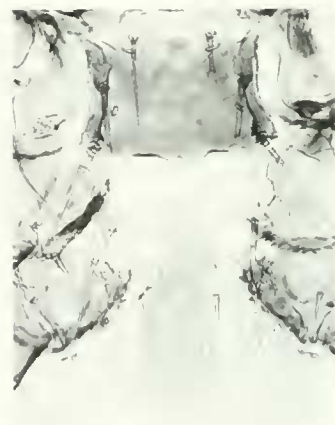
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9



10

Fig. 8-16. 8, *Gigantolaclaps canestrinii* Fonseca: sternal plate of female from *Oryzomys bicolor*, Trujillo state, X160. 9, *Gigantolaclaps gilmorei* Fonseca, Form A: sternal and genitoventral plates of female from *Oryzomys concolor*, Miranda state, 95X. 10, *Gigantolaclaps gilmorei* Fonseca, Form B: sternal and genitoventral plates of female from *Oryzomys capito*, Yaracuy state, 95X. 11, *Gigantolaclaps goyaneis* Fonseca: anteroventral view of female from *Nectomys squamipes*, Bolivar state, 95X. 12-13, *Gigantolaclaps guimaraesi* Lizaso, from *Oryzomys concolor*, Apure state, 107X: 12, anterodorsal view of female; 13, anteroventral view of female. 14, *Gigantolaclaps intermedia* Furman: anteroventral view of holotype female from *Neacomys tenuipes*, Dto. Federal, 95X. 15, *Gigantolaclaps mattogrossensis* (Fonseca): anteroventral view of female from *Holochilus brasiliensis*, Apure state, 95X. 16, *Gigantolaclaps oudemansi* Fonseca, Form 1: anteroventral view of female from *Oryzomys bicolor*, Bolivar state, 160X.

*Gigantolaelaps guimaraesi* Lizaso

(Fig. 12 and 13)

*Gigantolaelaps guimaraesi* Lizaso, 1968:253.—Furman, 1971a:86 [redescribed].

A single collection of 2 females was made from *Oryzomys concolor* taken 46 km NE Pto. Paez in Apure state at 76 m elev.

The specimens are somewhat smaller than the holotype of *G. guimaraesi*, the dorsal plate being only 1780  $\mu$  long as opposed to 2070  $\mu$ . Aside from correspondingly smaller measurements of sclerotized shields and setae, the general facies and relative proportions of structures agree closely with those of the holotype. The anterolateral margins of the dorsal plate exhibit an irregularity (Fig. 12) which suggests that a considerable difference might be found in numbers of accessory setae incorporated in the plate in different specimens. Although the majority of accessory setae are found on the anterolateral margins of the dorsal plate, there is a pair of accessory submedian setae between setae j4 and j5, in the position occupied by a single submedian seta in the holotype. These and other accessory setae of the dorsal plate are interpreted as being variable in position and number.

Lizaso (1968) places *G. guimaraesi* close to *G. gilmorei*, with which I agree, but its appearance is even closer to that of *G. versteegi*. It shares with both species a similar size and arrangement of setae on femora and genua I and II and in having only 6 rows of deutosternal teeth. The sternal plate of Venezuelan specimens of *G. guimaraesi* appears to have a more prominent anteromedian projection than the other 2 species, but this is due mainly to rather deep invaginations of the anterior margin of the plate lateral to the insertions of the first pair of sternal setae (Fig. 13).

*Gigantolaelaps inca* Fonseca*Gigantolaelaps inca* Fonseca, 1960b:11.—Furman, 1971a:84 [redescribed].

*Gigantolaelaps inca* was the most commonly encountered species of the genus in Venezuela. A total of over 4000 specimens was taken from 275 hosts. Most of the mites were females, as expected with a nidicolous species, but included were 22 males, 3 nymphs and 13 larvae. By far the most common host was *Oryzomys albigularis*; from 220 infested specimens of this host there were collected 3,810 *G. inca*. Most of the 29 other species of animals found infested are considered only as accidental hosts. Those

hosts found infested 4 or more times were *O. minutus* (5), *Rhipidomys venustus* (6), *Heteromys anomalus* (5), *Akodon urichi* (5). *G. inca* in Venezuela seems confined essentially to mountainous areas of the north and west between elevations of 1050 and 3300 m. States of most common occurrence listed in decreasing order of incidence were Dto. Federal, Merida, Trujillo, Aragua, Tachira, Miranda and T. F. Amazonas.

Specimens of *G. inca* agree well with Fonseca's original description as well as that of Furman and Tipton (1961). In addition to characters previously recorded, the following are noted for the species: there are 6 rows of deutosternal teeth, femur II has 2 prominent, apicodorsal, subequal, long setae; genu II has 1 relatively long dorsal seta, plus 5 other dorsal setae, all but 1 of which are very short.

*G. inca* is distinct from the closely related *G. boneti* Barrera, 1970 (= *G. trapidoi* Lee and Furman 1970) as noted in the key to species. The latter has not yet been recorded from Venezuela, but its recorded hosts include *Oryzomys albigularis*, and its known geographic range extends from Colombia to Mexico.

*Gigantolaelaps intermedia* Furman

(Fig. 14)

*Gigantolaelaps intermedia* Furman, 1971b:709.

A total of 110 female and 2 male *G. intermedia* was identified from 25 positive host specimens collected in north central and northwestern Venezuela. The mite occurred most commonly on *Neacomys tenuipes*, but single collections of 1 to 10 mites each were recorded from *Oryzomys albigularis*, *O. minutus*, *O. fulvescens* and *O. concolor*.

*G. intermedia* is closely related to *G. tiptoni*, a common parasite of *O. minutus*, but also occasionally found on *N. tenuipes*. Females of *G. intermedia* are separable from *G. tiptoni* in that the sternal plate is deep in relation to width (Fig. 14 and 21); the anteromedian projection of the sternal plate is quadrate and similar in appearance to that of *G. vitzthumi* instead of a shallow rounded dome as in *G. tiptoni*; all coxal setae are spiniform, with the exceptions of the distal seta of coxa I and posterior seta of coxa II; by contrast in *G. tiptoni* all coxal setae except the posterior seta of coxa III are setiform; the ventral opisthosoma of *G. intermedia* is more densely setose than in *G. tiptoni*.

Females of *G. intermedia* are separable from the related species *G. peruviana*, *G. vitzthumi* and *G. wolffsohni* in having only 6 to 7 rows of



deutosternal teeth instead of 9 (rarely 8) to 12 rows, and in having the apicodorsal pair of setae of femur II subequal and of moderate length instead of having 1 seta of this pair 2 to 3 times as long as the other. As a further distinction from *G. wolffsohni*, setae J5 of *G. intermedia* are less than  $\frac{1}{2}$  as long as setae Z5, while in Oudemans' species J5 is  $\frac{2}{3}$  or more as long as Z5.

*Gigantolaelaps mattogrossensis* (Fonseca)

(Fig. 15)

*Macrolaelaps mattogrossensis* Fonseca, 1935a:22.

*Gigantolaelaps mattogrossensis*, Fonseca, 1939a: 41.—Furman, 1971a:77.

*Gigantolaelaps cricetarum* Morlan, 1951: 274.—New syn.

*Gigantolaelaps mattogrossensis* was encountered rarely in Venezuela. Fifty-three females and 1 male were taken from 10 *Holochilus brasiliensis* at elevations ranging from 18 to 1111 m in the states of Monagas, Carabobo and Apure. A single female each was taken from *Sigmodon hispidus* in Carabobo at 1091 m and from *Marmosa robinsoni* in Falcon at 13 m.

Venezuelan specimens of *G. mattogrossensis* agree well with the holotype specimen as studied by Furman (1971a). There is some range of variation in characteristics, as for example in size of the dorsal plate, which ranges in length from 1482 to 1610  $\mu$ . Similarly the shape of the posterior margin of the dorsal plate varies from convex to definitely concave. In addition to characters previously recorded, the following comments apply to Venezuelan specimens: the deutosternal groove bears 9 to 12 rows of denticles. Femur I bears a subequal pair of prominent apicodorsal setae (AD1 and PDI) about 400  $\mu$  long. Genu I bears a prominent, long, proximodorsal seta (PD3) about 360  $\mu$  long and an associated shorter seta (AD3) about 145  $\mu$  long. The apicodorsal pair of setae of femur II consists of 1 long seta (PDI) of about 350  $\mu$  and a relatively short one (ADI) of about 115  $\mu$ . Genu II has 1 prominent dorsal seta of about 150  $\mu$  length, relatively long in comparison to the other 5 dorsal setae of the segment.

*G. mattogrossensis* differs from the closely related *G. goyanensis* in possessing a sternal plate (Fig. 15) which is much wider at the level of the second pair of sternal setae than the length at midline, and although there is considerable variation in size of coxal setae,

those of coxa I are usually less stoutly spiniform and more acutely pointed than in *G. goyanensis*.

In Venezuela *G. mattogrossensis* is associated closely with *Holochilus brasiliensis*, while *G. goyanensis* is common only on *Nectomys squamipes*.

Comparison of a paratype of *G. cricetarum* with the holotype of *G. mattogrossensis* as well as with Venezuelan specimens of the latter provided no basis for distinguishing between these forms. *G. cricetarum* is declared a synonym of *G. mattogrossensis*.

*Gigantolaelaps oudemansi* Fonseca

(Fig. 16-18)

*Gigantolaelaps oudemansi* Fonseca, 1939a:15 and 64.—Furman, 1971a:85.

There are 3 general morphological forms of *G. oudemansi* with occasional overlap between 2 of the forms.

A total of 627 specimens of *G. oudemansi* was identified from 87 infested hosts in Venezuela. Of these, 76 females, 1 deutonymph and 2 larvae are designated as form I. Form I was collected from each of 4 *Oryzomys concolor*, 3 *O. capito* and 1 *O. macconnelli* in T. F. Amazonas; from 4 *O. bicolor* in T. F. Amazonas, Carabobo and Bolivar states; and from 1 *Akodon urichi* in the state of Bolivar. No host information is available for the remaining collection of 3 females. Collections were made at elevations of 135 to 1537 m.

Form II was represented by 88 females taken on 27 infested hosts. It occurred on 11 *O. concolor* collected in descending order of frequency in the states of Bolivar, Monagas, Apure and Trujillo; from 14 infested *O. bicolor* it was taken in the states of Sucre, Apure, Trujillo and the border of Yaracuy and Carabobo. A single collection each was made from *O. albigularis* in Dto. Federal and from *Rhipidomys* sp. in Guarico. Most collections were made at low elevations, but recorded elevations ranged from 4 to 2151 m.

Form III was represented by 457 females, 1 male and 2 deutonymphs taken on 46 infested hosts. It occurred on 27 *O. concolor* collected in descending order of frequency in the Dto. Federal, and states of Miranda, Monagas, Bolivar, Trujillo and Zulia. Other hosts found infested were 1 *Oryzomys* sp. and 4 *O. capito* in Bolivar, Monagas and T. F. Amazonas, 2 *O. macconnelli* in Bolivar state, 3 *O. albigularis* in Aragua, Bolivar and Dto. Federal, 3 *Rhipidomys venustus* in Merida state and Dto. Federal, 1



*R. venezuelae* in Bolivar and 1 *Akodon urichi* in Tachira. Form III was collected on hosts at elevations ranging from sea level to 3130 m.

Neither host records nor geographic distribution provide a sound basis for distinguishing between the 3 forms of *G. oudemansi*, although form II was taken only in the northern ⅓ of Venezuela. *O. concolor* was a common host of all 3 forms, with form III being the most frequently encountered. *O. bicolor* also harbored forms I and II.

Form I is of variable size, with a dorsal plate ranging from 1200 to 1680  $\mu$  long. The proximal seta of coxa I is an evenly tapered setiform 100 to 144  $\mu$  long; the distal seta of coxa I is only slightly longer than the proximal seta (Fig. 16).

Form II has a dorsal plate ranging from 1285 to 1420  $\mu$  long. The proximal seta of coxa I is a stout spiniform 48 to 61  $\mu$  long; the distal seta of coxa I is over twice as long as the proximal spiniform seta (Fig. 17).

Form III is somewhat intermediate between forms I and II. The dorsal plate varies from 1160 to 1600  $\mu$  long. The proximal seta of coxa I is an acuminate spiniform, flexible apically, 77 to 112  $\mu$  long; the distal seta of coxa I is 1.5 to 2 times longer than the proximal spiniform seta (Fig. 18).

Based on the restudy of Fonseca's holotype of *G. oudemansi* reported by Furman (1971a), in comparison with the currently recorded specimens from Venezuela, a rediagnosis of the female of the species is given.

A small to medium sized species for the genus, with idiosoma 1220 to 1900  $\mu$  long. Dorsal plate bluntly ovoid, usually leaving wide margins of the idiosoma uncovered laterally and posteriorly, measuring 1190 to 1670  $\mu$  long by 700 to 935  $\mu$  wide; bearing 43 to 44 pairs setae. Sternal plate with 3 to 6 relatively small accessory setae located anteriorly. Genital setae variable but usually reaching about to posterior margin of genitoventral plate. Coxa I with proximal seta varying from a long setiform almost as long as the distal seta, to a stout spiniform less than ½ the length of the distal seta. Femur I with 2 prominent apicodorsal setae, 1 of which is 2 or more times longer than the other. Coxa II with long posterior seta varying from 150 to 307  $\mu$ . Deutosternal groove bearing 6 rows of denticles.

*G. oudemansi* is closely related to *G. aiteni* Lee and Strandtmann from which it differs in lacking hypertrichy of the dorsal plate. *G. striatus* Lee and Strandtmann is also closely re-

lated to *G. oudemansi*, but differs in having a short, narrow genitoventral plate with genital setae far surpassing the posterior border.

### *Gigantolaelaps peruviana* (Ewing)

(Fig. 19 and 20)

*Macrolaelaps peruvianus* Ewing, 1933:7.

*Gigantolaelaps peruvianus*, Fonseca, 1939a:10 and 60.

A total of 115 females and 1 deutonymph of *G. peruviana* was identified from 62 positive host specimens collected in Dto. Federal and the states of Monagas, Bolivar, Sucre, Carabobo, Falcon, Miranda, and T. F. Amazonas. The majority of specimens were taken from *Oryzomys fulvescens* in the states of Monagas, Bolivar, Falcon, Carabobo and Sucre. Collections from other hosts were rare and are considered accidental associations. Collections of positive hosts were made at elevations ranging from sea level to 1770 m.

In the past, considerable confusion has arisen in distinguishing between *G. peruviana* and the closely related *G. wolffsohni*. Furman and Tipton (1961) and Tipton et al. (1966) considered *G. peruviana* a synonym of *G. wolffsohni*. Comparison of cotypes of the former with type material of Oudemans demonstrates differences between the 2 species which appear to be constant in specimens currently reported from Venezuela.

### REDESCRIPTION

The following redescription of the female of *G. peruviana* is based on study of 2 of Ewing's cotypes No. 1072, followed in parentheses by corresponding data from 10 female specimens collected in Venezuela; idiosomal length 1825  $\mu$  (1540 to 1870). Dorsal plate 1690  $\mu$  long (1490 to 1585) and 1042  $\mu$  wide (930 to 1020); posterior margin markedly concave on 1 cotype and slightly concave on the other (slightly concave to slightly convex on Venezuelan specimens); setae j5 - 215  $\mu$  long (199 to 226), longer than distance between bases of setae j5 and z5; setae j5 - 107  $\mu$  long (75 to 107); setae Z5 tilted and not measured on cotypes (215 to 274  $\mu$  long in Venezuelan specimens) (Fig. 19). Sternal plate length at midline 276  $\mu$  (295 to 322); width at level of setae II 354  $\mu$  (376 to 408); shape of plate as given in Fig. 20. Sternal setae I 279  $\mu$  long (295 to 360); setae III 349  $\mu$  long (344 to 408); distance between bases of setae I 115  $\mu$  (124 to 140); distance between bases of setae III 338  $\mu$  (381 to 424). Genito-

ventral plate 245  $\mu$  long (242 to 279) measured from level of genital setae trichopores to posterior end of plate, and with maximum posterior width of 247  $\mu$  (226 to 285), slightly expanded posteriorly (slight to no posterior expansion); genital setae 279  $\mu$  long (284 to 327), extending well beyond posterior margin of plate. Anal plate of inverted pyriform shape, 268  $\mu$  long (209 to 236) and 220  $\mu$  wide (199 to 236); adanal setae 167  $\mu$  long (156 to 215); postanal seta broken in cotypes (252 to 295  $\mu$  long). Ventral opisthosomal cuticula with numerous setae, longer posteriorly to greatest length of 268  $\mu$ . Gnathosomal setae 92  $\mu$  long (85 to 93); inner hypostomal setae 134  $\mu$  long (126 to 161). Deutosternal groove with 9 rows of denticles (8 to 12 rows, rarely as few as 8 rows). Legs with proximal seta of coxa I a slim, stiff spiniform 80  $\mu$  long (94 to 120) and 14.5  $\mu$  wide (12 to 16  $\mu$  wide, in Venezuelan specimens varying from slim spiniform to setiform with slightly swollen base); distal seta slender setiform, 111  $\mu$  long (125 to 140). Posterior seta of coxa II 350  $\mu$  long (322 to 392) reaching to mid-level of coxa IV. Femur I with 2 apicodorsal, prominent, long subequal setae 383 and 350  $\mu$  long (360 to 430 and 349 to 403). Genu I with 1 long and 1 short proximodorsal setae 337 and 134  $\mu$  long. Femur II with apicodorsal pair of setae grossly unequal, 1 member of the pair about 2 or more times longer than the other (as in Venezuelan specimens).

It is apparent that there is a great deal of variation in *G. peruviana*, but diagnostic features are found as follows: a pair of prominent, long, subequal, apicodorsal setae on femur I, and in a similar position on femur II a pair of prominent setae which are grossly unequal; the presence of 9 to 12 (rarely 8) rows of deutosternal denticles; a short pair of posterior subterminal setae (J5) on the dorsal plate, which are less than  $\frac{1}{2}$  as long as setae Z5. The latter represents the best single diagnostic criterion for distinction from *G. wolffsohni*, in which setae J5 are very long,  $\frac{2}{3}$  or more as long as setae Z5.

It seems quite possible that *G. peruviana* and *G. wolffsohni* may intergrade completely, but specimens so far examined are readily distinguishable. In this respect it is of interest to note that in Venezuela both typical *G. wolffsohni* and the more frequently encountered *G. peruviana* were taken most commonly from *O. fulvescens*.

Distinguishing characters separating *G. peruviana* from *G. tiptoni* and *G. intermedia* are given in the discussion of those species.

The species name *G. peruvianus* is emended here to *G. peruviana* since the generic name is of feminine gender.

### *Gigantolaelaps tiptoni* Furman

(Fig. 21)

*Gigantolaelaps tiptoni* Furman, 1971b:707.

Two hundred and thirteen females and 1 male *G. tiptoni* were identified from 123 host specimens collected in various parts of Venezuela. *Oryzomys minutus* was the only host commonly infested, with occasional, or single collections recorded from *O. fulvescens*, *Neacomys tenuipes*, *Cryptotis thomasi*, *Mus musculus* and *Marmosa dryas*. Most collections were made at elevations of 2000 to 4000 m. Infested hosts were collected in Dto. Federal and the states of Merida, Tachira, Trujillo, Monagas, Sucre and Yaracuy.

*G. tiptoni* is closely related to *G. intermedia*. See the discussion of the latter species for distinction of the species. It is also separable from the related species, *G. peruviana*, *G. vitzthumi* and *G. wolffsohni* by the same features used in separating these species from *G. intermedia*.

### *Gigantolaelaps versteegi* (Oudemans)

(Fig. 26 and 27)

*Laelaps versteegii* Oudemans, 1904:223.

*Gigantolaelaps versteegi*, Fonseca, 1939a:11 and 61.

Through the courtesy of Dr. L. van der Hammen it was possible to study type material of both sexes of *G. versteegi* deposited in the Rijksmuseum van Natuurlijke Historie. Oudemans' original description, excellent though it was, left several critical features in doubt. The following supplementary redescription of the type material is given to clarify these features. The type female is mounted with 2 other females from the same collection on a single slide, with the type indicated as the largest of the 3. The following data pertain to the type female unless otherwise indicated.

#### REDESCRIPTION

FEMALE: Idiosoma 2040  $\mu$  long. Dorsal plate 1720  $\mu$  long and 1003  $\mu$  wide, broadly rounded, convex posteriorly, narrowed anteriorly, with shoulders over coxae II; setae somewhat longer than figured by Oudemans; setae j5 missing in type but 188  $\mu$  long in specimens on same slide, extending past bases of setae z5;

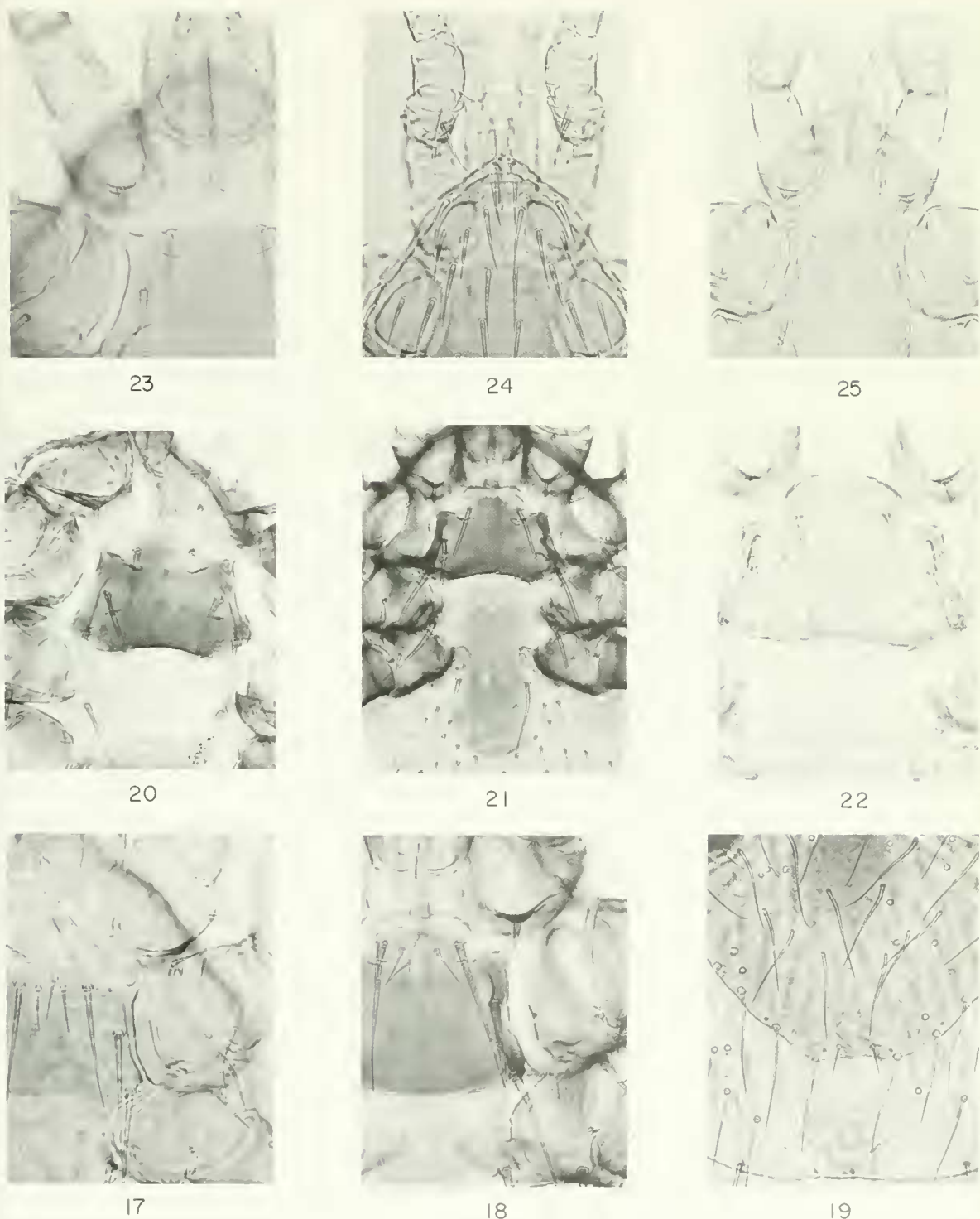


Fig. 17-25. 17-18, *Gigantolaelaps oudemansi* Fonseca: 17, Form II, anteroventral view of female from *Oryzomys concolor*, Monagas state, 160X; 18, Form III, anteroventral view of female from *Oryzomys concolor*, Dto. Federal 160X. 19-20, *Gigantolaelaps peruviana* (Ewing): 19, posterior end of dorsal plate of female from *Oryzomys fulvescens*, Monagas state, 126X; 20, anteroventral view of cotype female, Peru 126X. 21, *Gigantolaelaps tiptoni* Furman: anteroventral view of female from *Oryzomys minutus*, Merida state, 95X. 22, *Gigantolaelaps wolffsohni* (Oudemans): sternal plate of type female, 160X. 23, *Laelaps acuminata* Furman: anteroventral view of female from *Oryzomys concolor*, Dto. Federal. 400X. 24-25, *Laelaps crinigera* Furman, female from *Oryzomys concolor*, T. F. Amazonas, 272X: 24, anterodorsal view; 25, anteroventral view.



posterior subterminal setae J5 - 85  $\mu$  long; posterior terminal setae Z5 - 245  $\mu$  long, longest setae of body; total number of dorsal plate setae obscure in type but about 50 pairs visible in 1 of original type series. Sternal plate 269  $\mu$  long on midline and 381  $\mu$  wide at level of setae II, shape as figured by Oudemans for the type but variable as seen in 1 other specimen on slide, having convexly rounded posterior lateral margins rather than concavities behind setae III (Fig. 26); sternal setae I 269  $\mu$  long with trichopores separated by 145  $\mu$ ; setae III 311  $\mu$  long with trichopores separated by 365  $\mu$ ; pale areas subtend anteriorly trichopores of setae II and III of type female. Genitoventral plate 311  $\mu$  long measured from trichopores of genital setae to posterior margin; plate very slightly expanded posteriorly, about 220  $\mu$  wide at greatest posterior width; genital setae 279  $\mu$  long. Adanal setae not distinct in type but about 161  $\mu$  long in 1 of other original specimens. Postanal seta about 295  $\mu$  long. Ventral opisthosomal cuticula with numerous setae as illustrated by Oudemans. Gnathosomal setae 113  $\mu$  long. Inner hypostomal setae 172  $\mu$  long. Chelicerae (type chelicera mounted on separate slide) exactly as depicted by Oudemans. Deutosternal groove denticles not visible in type but with 6 rows of denticles visible in 1 of other original specimens. Legs with proximal seta of coxa I 150  $\mu$  long, 15  $\mu$  wide at base, setiform; distal seta 160  $\mu$  long, a very slender setiform. Posterior seta of coxa II longer than other coxal setae but short for the genus, 199  $\mu$  long, extending almost to mid-level of coxa III. Posterior seta of coxa III spiniform, 86  $\mu$  long and 18  $\mu$  wide at base. Femur I with apicodorsal setae indistinct and apparently with 1 member of usual pair of prominent setae broken (illustrated by Oudemans as having 1 long and 1 short apicodorsal setae). Genu I with proximodorsal pair of setae consisting of 1 long and 1 medium length seta. Femur II with 2 prominent apicodorsal setae subequal and of moderate length.

MALE: The following data are based on study of the type specimen of the male of *G. versteegi*, dissected and mounted on 3 slides.

Idiosoma 1636  $\mu$  long. Dorsal plate 1600  $\mu$  long and 907  $\mu$  wide. Wide lateral and a narrow posterior margin of uncovered dorsal cuticula bearing many setae. Dorsal plate with accessory setae laterally, longer but slimmer than lateral cuticular setae; setae j1 - 91  $\mu$  long; setae j5 broken but longer than distance between trichopores of setae j5 and z5. Setae J5 and Z5 oriented so that measurement impractical, but over 61 and 172  $\mu$  respectively. Holoventral plate outline obscured by body residue in opisthosomal

region, but lateral emarginations visible in region where Oudemans illustrated complete separation of anal plate from remainder of holoventral plate; present condition of specimen permits no definite confirmation of Oudemans' interpretation; accessory setae of ventral portion of plate about 128  $\mu$  long, longer than illustrated by Oudemans. Sternal setae I 204  $\mu$  long, reaching bases of setae III, which are 247  $\mu$  long; trichopores of setae I separated by 107  $\mu$ , of setae III by 258  $\mu$ . Gnathosomal setae 61  $\mu$  long; inner hypostomal setae 120  $\mu$  long, in marked contrast to Oudemans' illustration. Chelicerae as figured by Oudemans, with spermadactyl 260  $\mu$  long. Deutosternal groove with 6 rows of 1 to 4 denticles each. Legs with setae of coxa I and posterior seta of coxa II broken. Posterior seta of coxa III a thin spiniform. Femur I with apicodorsal pair of setae consisting of 1 long seta, the other broken. Genu I with proximodorsal pair of setae unequal, 269 and 129  $\mu$  long respectively. Leg II with the usual modified ventral spines apparently present but much reduced and consisting of 1 on the femur plus 2 empty trichopores, 1 on the genu, and on the tibia an empty trichopore in normal position of spine (Fig. 27). Tarsus II with several ventral prominent, short, stout, blunt spines including a curved apical spine, several longer straight medial spines and a similar shorter one basally; both medially and distally there are somewhat more slender and pointed spines and setae as illustrated (Fig. 27).

The original collection data given by Oudemans for *G. versteegi* cited the host as a *Mus* sp. collected near the Wilhelmina River in Surinam. No specimens identified as *G. versteegi* were recorded during the present survey of the Venezuelan fauna. The present description is given, however, to differentiate it from the closely related *G. amazonae*, which might have been considered as *G. versteegi* if reliance had been placed only on the original description by Oudemans.

*Gigantolaelaps wolffsohni* (Oudemans)

(Fig. 22)

*Laelaps wolffsohni* Oudemans, 1910:147.

*Gigantolaelaps wolffsohni*, Morlan, 1951:273.

*Macrolaelaps butantanensis* Fonseca, 1936a:21.

*Gigantolaelaps butantanensis*, Fonseca, 1939a:44, 93.—Furnan, 1971a:83 [redescribed].—New syn.

*Gigantolaelaps comatus* Fonseca, 1939a:39, 87.—Furnan, 1971a:83. [redescribed].—New syn.



Only 12 females and 1 nymph of this rarely encountered species in Venezuela were taken from 8 positive host specimens in a limited area of northeastern Venezuela. Eleven specimens were collected from 6 *Oryzomys fulvescens* collected 54 km SE Maturin, Monagas at 18 m elev. One was from *Sigmomys alstoni* at the same location, and 1 was from *Mus musculus* collected at Independencia, Bolivar at 824 m elev.

Through the kindness of Dr. L. van der Hammen of the Rijksmuseum van Natuurlijke Historie, it was possible to study the type of *G. wolffsohni* and make comparisons with Fonseca's types of *G. butantanensis* and *G. comatus* which I studied in São Paulo, Brazil. The types of these 3 species vary only in very minor details, as discussed below, and those details by which they differ are almost completely overlapped by the range in variation observed in the currently reported collections from Venezuela.

Collection data provided by Oudemans (1910) for his type material of *G. wolffsohni* indicate merely that the host probably was a small rodent which was captured by Mr. John A. Wolffsohn, resident near Valparaiso, Chile. Fonseca (1936a) originally described *G. butantanensis* from an *Oryzomys eliurus* Wagner, caught at Butantã, São Paulo, Brazil. Fonseca (1939a) described *G. comatus* from the only known specimen, the female holotype, taken from an unidentified rat at Butantã, São Paulo, Brazil.

#### REDESCRIPTION

The following description of *G. wolffsohni* is based on study of Oudemans' original material, a female, followed in parentheses by corresponding data from 8 female specimens from the currently reported Venezuelan collections: idiosomal length 1610  $\mu$  (1693-1910). Dorsal plate 1556  $\mu$  long (1505-1620) and 1000  $\mu$  wide (945-1015); posterior margin convex (varying in Venezuelan specimens from a very shallow concavity to a pronounced medial notch); setae j5 - 242  $\mu$  long (279 to 295), longer than distance between bases of setae j5 and z5; setae J5 - 166  $\mu$  long (156 to 185),  $\frac{2}{3}$  as long as setae Z5 which are 242  $\mu$  long (243 to 274). Sternal plate length at midline 295  $\mu$  (301 to 322); width at level of setae II 400  $\mu$  (381 to 424); anteromedian projection of sternal plate of type specimen and of Venezuelan specimens more pronounced than figured by Oudemans and with anterolateral angles of plate produced anterolaterally (Fig. 22); sternal setae I 355  $\mu$  long (312 to 365), somewhat shorter than sternal setae III; distance between bases of setae I

150  $\mu$  (126 to 150); between setae III 418  $\mu$  (381 to 425). Genitoventral plate not expanded behind trichopores of genital setae (varies from little to no expansion in Venezuelan specimens); genital setae 295  $\mu$  long (306 to 328) extending well beyond posterior margin of plate. Anal plate tipped in type but of inverted, broadly pyriform shape; adanal setae tilted in type but more than 172  $\mu$  long (172 to 215); postanal seta 301  $\mu$  long (295 to 322). Ventral opithosomal cuticle with many setae, the anterior, more centrally placed setae shorter, about 80  $\mu$  long; the more laterally or posteriorly placed setae longer, up to 268  $\mu$  long in the type. Gnathosomal setae 85  $\mu$  long (86 to 97); inner hypostomal setae 145  $\mu$  long (134 to 145). Chelicerae as figured by Oudemans, but minute seta at base of fixed digit not visible. Deutosternal groove with 10 rows of 1 to 2 denticles each (8 to 10 rows of 1 to 3 denticles each). Legs with proximal seta of coxa I a slender seta 110  $\mu$  long (103 to 118) and 12  $\mu$  wide at base (12 to 14, varying from slender setiform to somewhat swollen toward base); distal seta 140  $\mu$  long (124 to 145) and more slender than proximal seta. Posterior seta of coxa II 392  $\mu$  long (344 to 419), reaching about to mid-level of coxae IV. Femur I with 2 apicodorsal, prominent, long, subequal setae 510 and 484  $\mu$  long (510 to 562 and 456 to 510). On the type specimen the presumably longest proximodorsal seta of genu I is broken (this is a very long seta in Venezuelan specimens, although somewhat shorter than the longest setae of femur I). Apicodorsal setae of femur II are, with 1 exception, broken on the type specimen (Venezuelan specimens have a pair of prominent, grossly unequal, apicodorsal setae on femur II, 1 of which is 2 or more times as long as the other).

Comparable descriptive data based on study of the types of *G. butantanensis* and *G. comatus* were given by Furman (1971a). There it was pointed out that *G. comatus* lacks the posterior marginal notch in the dorsal plate, a feature considered diagnostic for *G. butantanensis* by Fonseca. This is now considered as a variable feature and leaves no valid distinctive criteria between the species *G. wolffsohni*, *G. butantanensis* and *G. comatus*.

The resurrection of *Gigantolaelaps peruviana* (Ewing) and its distinction from *G. wolffsohni* are discussed under *G. peruviana*.

#### Genus *Laelaps* Koch

*Laelaps* Koch, 1836:19.—Tipton, 1960:260 [generic revision].

Type Species: *Laelaps agilis* Koch, 1836.

The genus *Laelaps* consists of small to large mites with dorsal plate ranging from 450 to 1065  $\mu$  long. Female with sternal plate usually broader than long, but ranging to longer than broad; genitoventral plate with 4 pairs of setae. Some coxal setae usually spiniform. Peritremal plates extend posterior to stigmata but not fused with parapodal platelets. Dorsal plate with 39 or more pairs setae. Chaetotaxy of legs I to IV respectively for females of all Venezuelan species as follows: trochanter - 6, 5, 5, 5; femur - 13, 11, 6, 6; genu - 13, 11, 9, 10; tibia - 13, 10, 8, 10. Chelicerae chelate-dentate in females with the movable digit bidentate. Fixed digit in males reduced, edentate; movable digit edentate and partially fused with elongated, grooved spermadactyl. Arthrodial processes at base of movable digit short, setiform. Deutosternum with 6 or rarely 7 rows of denticles, each row

with 2 to 5 denticles. Tectum membranous, rounded anteriorly.

The concept of the genus *Laelaps* followed here represents a modification of that given by Tipton (1960), enlarging the scope of the genus to include *Echinolaelaps* Ewing, 1929 as a subgenus. This is in accord with the concept advanced by Strandtmann and Mitchell (1963). *Laelaps* is considered distinct, however, from the related Neotropical genera *Tur*, *Mysolaelaps*, *Steptolaelaps* and *Gigantolaelaps*.

Venezuelan species of *Laelaps* are of common occurrence in the nests and on the bodies of cricetid rodents of the tribe Hesperomyini. Occasional species have been introduced with murid rodents, with which they usually remain rather closely associated. Of the 20 species of *Laelaps* recognized from South America, 16 are recorded here from Venezuela.

### Key to South American Species of *Laelaps*

#### Females

1. Marked hypertrichy of dorsal plate ..... 2  
Dorsal plate with 39 to 43.5 pairs setae ..... 4
2. Dorsal plate with approximately 46 to 49 pairs setae. Proximal seta of coxa I a strong acuminate setiform about 8 times longer than wide and about 1½ times longer than piliform distal seta. Longest dorsal setae of femur and genu I about 44 and 41  $\mu$  respectively. Ex *Rhipidomys* ..... *Laelaps surcomata* Furman, 1972  
Dorsal plate with 60 or more pairs setae. Proximal seta of coxa I a strong setiform or a weak spiniform 3.5 to 6 x longer than wide and subequal to, or up to 1½ times longer than, stout distal seta. Longest dorsal setae of femur and genu I 65 to 85 and 67 to 110  $\mu$  respectively ..... 3
3. Dorsal plate with about 85 to 100 pairs setae; distance between genital setae 109 to 113  $\mu$ ; 28 to 30 pairs setae on unarmed ventral opisthosoma. Ex *Oryzomys* ..... *Laelaps navasi* Fonseca, 1939  
Dorsal plate with 60 to 74 pairs setae; distance between genital setae 70 to 77  $\mu$ ; about 18 to 24 pairs setae on unarmed ventral opisthosoma. Common on *Calomys hummelincki*, *Calomys* sp. and *Oryzomys eliurus* ..... *Laelaps mazzai* Fonseca, 1939
4. Sternal plate length on midline subequal to or greater than width at level of setae II, or if slightly wider than long, setae Z5 of dorsal plate small, subequal to setae J5 ..... 5  
Sternal plate length definitely less than width at level of second pair of setae; length/width ratio of plate ranging from 0.50 to 0.84. Setae Z5 of dorsal plate much longer than setae J5 ..... 9
5. Setae Z5 of dorsal plate not enlarged, subequal to setae J5. Sternal setae I not reaching bases of setae II. Genitoventral plate setae all short and subequal, not reaching bases of following pairs of setae. Ex *Oryzomys* species ..... *Laelaps spicata* Furman, 1972  
Setae Z5 of dorsal plate much larger than setae J5. Sternal setae I extend past bases of setae II. At least genitoventral setae III and IV elongate ..... 6
6. Medium-sized mites with dorsal plate less than 650  $\mu$  long; setae Z5 of dorsal plate about 80  $\mu$  long. Ex *Oryzomys* species ..... *Laelaps crinigera* Furman, 1972  
Large mites with dorsal plate over 900  $\mu$  long; setae Z5 of dorsal plate over 110  $\mu$  long ..... 7

7. Genitoventral plate with concave posterior margin fitting around convex anterior margin of anal plate. Coxa I with proximal seta setiform and distal seta spiniform. Pilus dentilis knobbed and bent at apex. Ex *Rattus* species ..... *Laelaps* (*Echinolaelaps*) *echidninus* Berlese, 1887
- Genitoventral plate with convex posterior margin. Coxa I with both setae spiniform or with proximal seta spiniform and distal seta setiform. Pilus dentilis setiform, with or without basal inflation ..... 8
8. Femur I with thornlike dorsal spine and blunt posterolateral spine. Anterior margin of sternal plate with median concavity. Genital setae short, extending less than  $\frac{1}{2}$  the distance to bases of setae II. Ex *Neacomys tenuipes*, *N. spinosus*, *Sigmodon hispidus*, *Oryzomys fulvescens*, *Oryzomys concolor* and *Heteromys anomalus* ..... *Laelaps* (*Echinolaelaps*) *boultoni* Furman and Tipton, 1961
- Femur I lacking thornlike dorsal spine and blunt posterolateral spine. Anterior margin of sternal plate with median triangular projection. Genital setae long, extending almost to base of setae III. Common on *Rhipidomys macconnelli*. ..... *Laelaps* (*Echinolaelaps*) *conula* Furman, 1972
9. Proximal seta of coxa I setiform and distal seta spiniform. Genitoventral plate with bases of setae I separated by a distance subequal to that between setae IV. Ex *Rattus* species. .... *Laelaps nuttalli* Hirst, 1915
- Setal pattern of coxa I not as above. Genitoventral plate with bases of setae I more widely separated than bases of setae IV. .... 10
10. Adanal and postanal setae of subequal strength and length. Ex "wild rat" ..... *Laelaps exceptionalis* Fonseca, 1936
- Postanal seta clearly longer and stronger than adanal setae ..... 11
11. Gnathosomal setae about 73  $\mu$  long, about  $1\frac{1}{4}$  times longer than inner hypostomal setae. Sternal plate convex posteriorly. Adanal setae originate well behind posterior level of anus. Common on *Zygodonotomys brevicauda* ..... *Laelaps dearmasi* Furman and Tipton, 1961
- Gnathosomal setae less than 40  $\mu$  long, shorter than inner hypostomal setae. Sternal plate concave to sub-linear posteriorly. Adanal setae originate at or anterior to posterior level of anus. .... 12
12. Both proximal and distal setae of coxa I spiniform ..... 13
- Coxa I with proximal seta setiform or spiniform; distal seta piliform or setiform ..... 14
13. Central setae of dorsal plate reduced, small and delicate (including j4 to 6, J1 to 5, z5 and 6, px2 and 3); j5 about 20  $\mu$  long. Proximal spiniform seta of coxa I  $\frac{1}{2}$  longer than distal seta. Genital seta short, not reaching bases of setae II. Ex *Daptomys venezuelae* ..... *Laelaps manguinhosi calvescens* new subspecies
- Central setae of dorsal plate not reduced; j5 - 39 to 67  $\mu$  long. Proximal spiniform seta of coxa I subequal or slightly longer than distal seta. Genital setae longer, extending past bases of setae II. Common on *Holochilus* and *Nectomys* species and occurring on a variety of other rodents. .... *Laelaps manguinhosi manguinhosi* Fonseca, 1936
14. Proximal seta of coxa I a rather coarse setiform, evenly tapered from base to a very fine apex ..... 15
- Proximal seta of coxa I a strong spiniform, or if of intermediate strength, not evenly tapered from base to apex ..... 16
15. A small species, with dorsal plate 502 to 510  $\mu$  long. Gnathosomal setae short, 13 to 18  $\mu$  long. Proximal seta of coxa I 3.5 to 6 times longer than wide. Central setae of dorsal plate relatively short; setae j5 not extending to bases of setae z5. Common on *Oryzomys albigularis* ..... *Laelaps ovata* Furman, 1972
- A larger species, with dorsal plate about 678  $\mu$  long. Gnathosomal setae longer, 32  $\mu$  long. Proximal seta of coxa I over 8 times longer than wide. Central setae of dorsal plate longer; setae j5 extend past bases of setae z5. .... *Laelaps thori* Fonseca, 1939



16. Proximal seta of coxa I with abruptly acuminate, whiplike tip. Common on *Oryzomys concolor* and *Oryzomys bicolor* ..... *Laelaps acuminata* Furman, 1972  
Proximal seta of coxa I with rounded or abruptly and usually bluntly pointed tip, not acuminate ..... 17
17. Large species with dorsal plate more than 600  $\mu$  long; genitoventral plate broadly expanded behind coxae IV, 189 to 280  $\mu$  wide. Longest posterior opisthosomal setae over 130  $\mu$  long ..... 18  
Small to medium-sized species with dorsal plate less than 600  $\mu$  long; genitoventral plate less than 170  $\mu$  wide at greatest width. Longest posterior opisthosomal setae not over 100  $\mu$  long ..... 19
18. Dorsal plate 767 to 981  $\mu$  long. Proximal seta of coxa I a narrowly elliptical, bluntly tipped spiniform. Setae of posterior opisthosomal margin stiff and straight. Common on *Rhipidomys* and *Oryzomys* species ..... *Laelaps paulistanensis* Fonseca, 1936  
Dorsal plate 604 to 654  $\mu$  long. Proximal seta of coxa I a stoutly conical spiniform. Setae of posterior opisthosomal margin flexible, often appearing sinuous. Common on *Oryzomys minutus* ..... *Laelaps flexa* Furman, 1972
19. Adanal setae arise approximately at posterior level of anus. Long apicodorsal seta on femur of leg I subequal to, or shorter than, long proximodorsal seta of genu. Dorsal plate ranging from 526 to 587  $\mu$  long ..... 20  
Adanal setae arise well anterior to posterior level of anus. Long apicodorsal seta on femur of leg I longer than long proximodorsal seta of genu. Dorsal plate ranging from 456 to 530  $\mu$  long ..... 21
20. Proximal seta of coxa I slightly shorter than the slim distal seta. Seta j1 of dorsal plate 28 to 30  $\mu$  long. Common on *Oryzomys fulvescens* ..... *Laelaps castroi* Fonseca, 1959  
Proximal seta of coxa I longer than the coarse distal seta. Seta j1 of dorsal plate 18  $\mu$  long ..... *Laelaps differens* Fonseca, 1936
21. Postanal seta short, 34 to 53  $\mu$  long. Dorsal plate lacking an extra seta between J3 and J4. Central setae of dorsal plate varying from very short and delicate to intermediate; j5 - 14 to 43  $\mu$  long ex *Oryzomys* species ..... *Laelaps pilifer* Tipton, 1966 (including Form A)  
Postanal seta 56 to 68  $\mu$  long. Dorsal plate with extra seta between setae J3 and J4. Central setae of dorsal plate strong and coarse; j5 - 67 to 75  $\mu$  long ex *Oryzomys* species and *Neacomys tenuipes* ..... Form B of *Laelaps pilifer* Tipton, 1966

*Laelaps acuminata* Furman

(Fig. 23)

*Laelaps acuminata* Furman, 1972:39.

A total of 797 females, 12 males and 4 nymphs of *L. acuminata* was identified from 62 infested host specimens in Venezuela; 676 were taken from 24 *Oryzomys concolor*, 92 from 18 *O. bicolor*, 6 from 4 *O. albigularis* and 5 from 5 *O. minutus*. Recoveries of the mite were made on 1 or 2 occasions each from a variety of other rodents, a marsupial and even from bats; these are considered as accidental associations. The mite was also taken from *Oryzomys* sp. in Sonso, Dept. Valle in Colombia by H. Trapido.

In Venezuela *L. acuminata* is a widespread species occurring at elevations from 4 to 3430 m. In descending order of frequency it was taken in the following states (or district): Monagas,

Dto. Federal, Bolivar, Sucre, Apure, Merida, Miranda, Carabobo, Trujillo, T. F. Amazonas, Tachira and Zulia.

The ♀ of *L. acuminata* is of medium size for the genus, with dorsal plate 586 to 664  $\mu$  long. Coxa I (Fig. 23) with proximal seta 3 to 5 times longer than wide, inflated basally and with a characteristic short, acuminate, flexible, whiplike tip; distal seta a slim setiform subequal in length to proximal seta. The characteristic proximal seta of coxa I separates it from its close relatives, *L. pilifer* Tipton, *L. thori* Fonseca and *L. ovata* Furman. It differs also from *L. pilifer* in being larger (dorsal plate only 456 to 530  $\mu$  long in *L. pilifer*) and in having relatively longer gnathosomal and inner hypostomal setae (Fig. 23). *L. thori* has a long, slim proximal seta on coxa I, 43  $\mu$  long by 5  $\mu$  wide in the holotype, and the distal seta is only  $\frac{2}{3}$  as long. *L. ovata* is smaller than *L. acuminata*,



having a dorsal plate 502 to 540  $\mu$  long, very short gnathosomal setae, 13 to 18  $\mu$  long, and a rather angulate genitoventral plate. In some areas *L. acuminata* and *L. ovata* are sympatric, even occurring occasionally together on *O. albigularis*, but in such instances no intergrading of differential characters has been observed.

One female identified as *L. acuminata* from *O. concolor* has setiform proximal setae on coxae I rather than the characteristic inflated seta with acuminate tip. In all other respects it fits the original description of the species, but on casual inspection might be confused either with *L. thori* Fonseca or *L. ovata* Furman.

*Laelaps (Echinolaelaps) boultoni*

Furman and Tipton

*Laelaps (E.) boultoni* Furman and Tipton, 1961:168.

A total of 73 females of *L. boultoni* from Venezuela was examined, of which 49 were from 9 *Neacomys tenuipes*, 15 from 2 *Oryzomys fulvescens*, 8 from 1 *O. concolor* and 1 from *Rhipidomys venezuelae*. Infested hosts were collected at elevations ranging from 404 to 1665 m in the Dto. Federal and the states of Miranda, Falcon, Bolivar, Aragua and Yaracuy.

Specimens examined agree well with the original description and figures of *L. boultoni*. The species is distinguished from other members of the subgenus *Echinolaelaps* by the presence of bulbous spines on coxae and femora of legs I.

*Laelaps castroi* Fonseca

*Laelaps castroi* Fonseca, 1959:116.—Furman, 1971a:70. [lectotype described].

A total of 477 females, 8 males and 9 nymphs of *Laelaps castroi* was examined from Venezuela; of these 452 were from 78 *Oryzomys fulvescens*. The remaining specimens represent single or occasional collections from a variety of other rodents and even bats; these are considered accidental associations. Infested hosts were collected from sea level to 1760 m elevation from localities in the following states, arranged in order of greater to lesser frequency of occurrence: Monagas, Carabobo, Miranda, Sucre and Falcon.

Venezuelan specimens of *L. castroi* agree rather closely with Fonseca's (1959) original description and with the redescription of the lectotype given by Furman (1971). They are slightly smaller, with a dorsal plate ranging from 526 to 575  $\mu$  long compared to 587  $\mu$  long

in the lectotype; they lack an accessory submedian seta anterior to setae J4 of the dorsal plate, and the coxal setae of leg I show a range of length to about 1/5th greater than that seen in the lectotype. These variations are considered within the normal intraspecific range.

*L. castroi* is closely related to *L. flexa* Furman, *L. pilifer* Tipton and also more distantly related to *L. paulistanensis* Fonseca and *L. manginhosi* Fonseca. Differential characters are considered in the discussion of those species.

From the lectotype of *L. differens* Fonseca, 1939, *L. castroi* differs in having setae j1 of the dorsal plate 28 to 30  $\mu$  long as opposed to 18  $\mu$ , and in having on the coxa of leg I a piliform to slender setiform distal seta, slightly longer than the proximal seta, whereas in *L. differens* the distal seta is coarse and much shorter than the proximal seta.

*Laelaps (Echinolaelaps) conula* Furman

*Laelaps conula* Furman, 1972:41.

A total of 620 females of *L. conula* was examined from 45 infested host specimens from Venezuela. The common host is *Rhipidomys macconnelli*; 39 infested specimens yielded 563 *L. conula*. Single collections were recorded from a variety of other rodents, a marsupial and a bat; these are considered accidental associations.

The majority of infested hosts was taken at an elevation around 1000 m (ranging from 150 to 1480 m). The mite was encountered only in T. F. Amazonas and the state of Bolivar.

*L. conula* is a typical member of the subgenus *Echinolaelaps* but easily distinguished from other species of the subgenus. It is a large, well-sclerotized species with a small, median, anterior, triangular projection on the sternal plate. Coxa I has a strong, gently tapered, rather sharply tipped proximal spine of modified fusiform shape. The genitoventral plate is broad and convexly rounded posteriorly. The dorsal plate has 6 to 7 extra setae on the posterocentral area.

*Laelaps crinigera* Furman

(Fig. 24 and 25)

*Laelaps crinigera* Furman, 1972:44.

This was a rarely encountered species in Venezuela, with a total of only 18 specimens encountered. Fifteen females of *L. erinigera* were examined from 5 infested *Oryzomys concolor*, 2 from 1 *O. minutus* and 1 from 1 *O. bicolor*. Infested hosts were taken at elevations of 76 to 2410 m, most from T. F. Amazonas, but also from Apure, Tachira and Bolivar states.

*L. crinigera* is a medium-sized species with superficial resemblance to *L. castroi*. The dorsal plate varies in length from 607 to 644  $\mu$  and has strong, relatively long setae (Fig. 24). Leg I with femur bearing a dorsoapical spiniform seta, 64 to 70  $\mu$  long, much longer and stronger than other dorsal leg setae (Fig. 24). Sternal plate is longer than, or subequal to, width (Fig. 25).

*Laelaps dearmasi* Furman and Tipton

*Laelaps dearmasi* Furman and Tipton, 1961:187.

*L. dearmasi* was the most commonly encountered species of the genus in Venezuela. A total of 12,889 females, 3,846 males, 2,122 nymphs and 72 larvae was examined from 674 infested hosts. By far the commonest host was *Zygodontomys brevicauda*. Unidentified species of *Zygodontomys* were the only other frequently recorded hosts. In addition to these hosts, 50 other species of vertebrates were recorded as infested with *L. dearmasi*. Most of these are regarded as purely accidental associations, but a few seem to represent more than casual relationships: 12 *Heteromys anomalus* had 62 females, 15 males and 8 nymphs; 6 *Proechimys guyannensis* had 51 females, 4 males and 5 nymphs; 8 *Sigmodon hispidus* had 10 females and 1 male.

Hosts found infested with *L. dearmasi* were taken at elevations ranging from sea level to 3200 m, but the majority were taken at elevations under 400 m. Infested hosts were collected in the following states and district, listed in order of greatest to least numbers: Trujillo, Miranda, T. F. Amazonas, Falcon, Monagas, Sucre, Yaracuy, Lara, Bolivar, Carabobo, Guarico, Dto. Federal, Apure, Merida, Zulia, Nueva Esparta.

*L. dearmasi* is the only South American species of the genus with very long gnathosomal setae extending well beyond the posterior margin of the gnathosoma in both sexes. Females are characterized by the convex posterior margin of the sternal plate, genital setae arising well inside lateral margins of genitaloventral plate, and adanal setae arising well posterior of the rear margin of the anus. The flexible setae of the body may appear either straight or sinuous. Heating specimens freshly mounted in Berlese type medium tends to accentuate the sinuous appearance of flexible setae.

*Laelaps (Echinolaelaps) echidninus* Berlese

*Laelaps (Echinolaelaps) echidninus* Berlese, 1887:157.

A total of 32 females and 1 nymph of *L. echidninus* was collected from 4 *Rattus rattus* collected at Salamanca, Nueva Esparta, Venezuela.

*L. echidninus* is a cosmopolitan parasite in temperate and tropical areas, primarily parasitizing murid rodents, especially species of *Rattus*. For a discussion of the systematics and range of morphological variation seen in *L. echidninus* reference is made to the excellent paper by Strandtmann and Mitchell (1963).

*Laelaps flexa* Furman

*Laelaps flexa* Furman, 1972:35.

A total of 1357 females, 47 males and 23 deutonymphs of *Laelaps flexa* was identified from 252 infested host specimens in Venezuela. The common host was *Oryzomys minutus*; from 217 infested specimens were taken 1220 females, 44 males and 24 deutonymphs of *L. flexa*. Occasional or single collections were recorded from a wide variety of rodents, a marsupial, an edentate, and even a bird. These are regarded as accidental associations. The majority of the collections were made at elevations around 3000 m (ranging from 1032 to 3810 m). *L. flexa* was encountered most frequently in the state of Merida, but numerous collections were made in the states of Tachira and Trujillo and in the Dto. Federal, with occasional records from the states of Aragua, Miranda, Apure, Sucre and Bolivar.

The adult female of *Laelaps flexa* is medium-sized for the genus with a broadly oval idiosoma 622 to 712  $\mu$  long. Some posterior body setae are conspicuously long (140 to 160  $\mu$ ), and flexible, often appearing sinuous. Coxa I has a proximal spiniform seta which is stout and triangular, about twice as long as basal width; the distal seta is slender but subequal in length to proximal seta. Gnathosomal setae are much shorter than inner hypostomal setae. Genitoventral plate broadly expanded posteriorly with relatively short genital setae just reaching bases of setae II of the plate. The male is characterized by numerous long, flexible setae on both legs and body, with the central dorsal plate setae much shorter than marginal and posterior setae.

*Laelaps flexa* is most closely related to *L. paulistanensis* Fonseca, but it is a smaller species with relatively longer and more flexible setae; in the female the sternal plate is more broadly concave posteriorly, and the proximal spiniform seta is not of the elongate, semi-elliptical, or fusiform shape seen in *L. paulistanensis*.

sis. The male of *L. flexa* is separable from *L. paulistanensis* by the much longer and flexible setae of the dorsal plate, except for those of the anterocentral area, and the similarly long, flexible setae of legs III and IV, the holoven-tral plate and ventral cuticula. The ventral area of the holoven-tral plate is less expanded than in *L. paulistanensis*, and the anterior ventral row of setae is composed of 3 pairs of setae rather than 2 pairs. The spermadactyl of *L. flexa* is only about 67  $\mu$  long compared to 85  $\mu$  long in Venezuelan specimens of *L. paulistanensis*.

- Laelaps manguinhosi manguinhosi* Fonseca  
*Laelaps manguinhosi* Fonseca, 1936c:34.—Fur-man, 1971a:72. [lectotype described].  
*Laelaps oryzomydis* Pratt and Lane, 1953:358.—New syn.

A total of 1262 *Laelaps manguinhosi man-guinhosi* was identified from 83 infested hosts

in Venezuela. Collections of the mite were nu-merous from *Holochilus brasiliensis*; 506 fe-males, 2 males (?) and 2 nymphs of *L. m. man-guinhosi* were obtained from 23 hosts. *Nectomys squamipes* was also frequently infested; 30 hosts produced 521 females, 1 male and 6 nymphs. Occasional or single collections were taken from a wide variety of rodents, marsu-pials, bats and a bird; despite the fact that some of the rodents were heavily infested, these latter records are considered representative of accidental associations. In common with other mites which are primarily nest inhabitants, *L. m. manguinhosi* would undoubtedly infest, at least temporarily, almost any warm-blooded ani-mal with which it came in contact.

The majority of collections was made below 500 m elevation, but the range over which the mite was found varied from 1 to 3430 m. *L. m. manguinhosi* was collected in Venezuela in the following states, arranged in order of greatest to least frequency: Trujillo, T. F. Amazonas,

TABLE 1. Comparison of members of *Laelaps manguinhosi* complex

Character	Lectotype <i>L. m. manguinhosi</i>	Paratype <i>L. oryzomydis</i>	Venezuelan <i>L. m. manguinhosi</i> <sup>*</sup>	Venezuelan <i>L. m. calvescens</i> <sup>**</sup>
Idiosoma length	676	610	602-682	596-650
Dorsal plate length/width	590/386	583/378	590-656/ 376-430	570-600/ 376-419
Extra seta on dorsal plate	yes (1)	yes (1)	yes (1 to 2)	no
length j1	25	26	27-32	25-26
length j5	52	52	49-67	18-24
length J5	41	45	37-48	28-32
length Z5	89	>79	88-100	65-73
Distance j5 to z5	44	49	46-55	48-51
Sternal plate length/width	87/141	93/143	81-100/ 140-161	95-98/ 153-161
Genitoventral plate length/width	140/170	156 165	150-172/ 169-182	142-161/ 170-188
Anal plate length/width	93/103	-/98	85-106/ 96-114	98-104/ 104-112
Adanal setae length	44	38	39-49	34-38
Postanal seta length	-	67	67-85	51-52
Gnathosomal setae length	15	14.5	14-19.5	13-15
Inner hypostomal setae length	42	30	35-43	30-35
Coxa I proximal seta length	26.5	approx. 29	30-38	30-33
width	13	11	12-14.5	12-14
Coxa I distal seta length	27.5	29	26-30	19-22
width	6.5	5	6-7	6-7

\*Range based on 15 specimens from *Holochilus brasiliensis* and *Nectomys squamipes*.

\*\*Range based on 4 specimens from *Daptomys venezuelae*



Monagas, Carabobo, Zulia, Bolivar, Apure, Merida, Miranda and Yaracuy.

*Laelaps m. manguinhosi* has a geographic range extending from Brazil to the United States. *Laelaps oryzomydis* Pratt and Lane, 1953, described from the southeastern United States ex *Oryzomys palustris*, is considered a synonym of *L. m. manguinhosi*. Examination of a paratype of *L. oryzomydis* indicated that it falls almost completely within the range of variation seen in specimens collected in Venezuela, as well as fitting closely the characters of the lectotype of *L. m. manguinhosi* (see Table 1). Two additional specimens from *O. palustris* in North Carolina and Texas, fall completely within the range of characters seen in Venezuelan specimens. Particularly variable is the length-width relationship of the proximal spine of coxa I, which varies from 2 to 3 times longer than wide.

From the closely related *L. castroi*, *L. m. manguinhosi* is distinguished by a coarse, often spiniform distal seta of coxa I as opposed to a slim setiform in *L. castroi*, and by the short gnathosomal setae, 14 to 19.5  $\mu$  long, as opposed to 24.5 to 30  $\mu$  in *L. castroi*.

*Laelaps manguinhosi calvescens*, new subspecies  
(Fig. 28-30)

DIAGNOSIS

A medium-sized mite differing from the nominotypic subspecies in having very small setae in the central area of the dorsal plate, short genital setae, and the proximal seta of coxa I about 1½ times as long as the distal seta (Table 1).

The description of the female of *Laelaps manguinhosi calvescens* is based on the holotype, followed in parentheses by the range of variation in 3 paratypes.

DESCRIPTION

**FEMALE:** Idiosoma broadly oval, 596  $\mu$  long (640 to 650). Dorsal plate (Fig. 28) covering all but narrow lateral and posterior margins of idiosoma, 570  $\mu$  long (590 to 600) and 376  $\mu$  wide (398 to 419); bearing 39 pairs of setae in the usual pattern, but with the following setae much reduced and delicate: j4 to 6. J1 to 5, z5 and 6, px2 and 3; setal lengths: j1 - 25  $\mu$  (26), j5 - 24  $\mu$  (18-24), J5 - 30  $\mu$  (28-32); distance between trichopores of setae j5 and z5 - 49  $\mu$  (48-51). Dorsolateral idiosomal margin with single row of setae about 43  $\mu$  long, subequal to adjacent marginal setae of dorsal plate, but becoming longer, up to 70  $\mu$ , posteriorly. **Venter.** Sternal plate 98  $\mu$  long on midline (95-98) and 161  $\mu$  wide (153-161) at level of

setae II; anterior margin almost straight; posterior margin gently concave; setae very slim, acuminate; setae I about 60  $\mu$  long (61-67), reaching level of second pair of pores, and with trichopores separated by 72  $\mu$  (68-72); setae III 85  $\mu$  long (84-85), and with trichopores separated by 150  $\mu$  (150-161). Genitoventral plate expanded behind coxae IV; length 142  $\mu$  (156-161) measured from anterior level of genital setae trichopores to posterior margin of plate; maximum posterior width 170  $\mu$  (177-188); genital setae 76  $\mu$  long (74-79) reaching approximate level of setae II trichopores; setae IV more closely spaced than genital setae. Anal plate broader than long, of inverted pyriform shape, 98  $\mu$  long (98-104) and 104  $\mu$  wide (110-112); adanal setae 38  $\mu$  long (34-38); postanal seta stronger and longer, 51  $\mu$  (51-52). Metapodal platelets roughly rod shaped, about 35  $\mu$  x 10  $\mu$ . Tubular peritreme extending to anterior level of coxae II. Unarmed opisthogaster with 5 to 6 pairs of setae. **Gnathosoma.** Chelicerae normal, with pilus dentilis slightly inflated basally, gently curved and setiform apically. Gnathosomal setae 15  $\mu$  long (12-15), and inner hypostomal setae 30  $\mu$  long (32-35). Deutosternal groove with 6 rows of denticles. **Legs.** Coxa I (Fig. 30) with proximal seta a stoutly triangular spiniform 33  $\mu$  long (30-33) and 12  $\mu$  wide (13-14) at base; distal seta a slim spiniform 19  $\mu$  long (19-22) and 6  $\mu$  wide at base (6-7); posterior seta of coxa III rather spiniform. Leg I with a prominent, long, dorsoapical seta about 43  $\mu$  long on the femur and a longer proximodorsal seta on the genu, about 52  $\mu$  long (Fig. 29). Chaetotaxy of legs I to IV respectively: trochanter - 6, 5, 5, 5; femur - 13, 11, 6, 6; genu - 13, 11, 9, 10; tibia - 13, 10, 8, 10.

**TYPE DATA:** Female holotype and 13 paratypes were collected from *Daptomys venezuelae* (SVP 16634), Cerro Duida Cabecera del Caño Negro, T. F. Amazonas, Venezuela, 1400 m elev., 15-II-67 by the M. D. Tuttle team. The male and immature stages are unknown.

*Laelaps mazzai* Fonseca

(Fig. 31)

*Laelaps mazzai* Fonseca, 1939b:112 and 135.

*Schizolaelaps mazzai*, Fonseca, 1959:139. [male redescribed and illustrated].

*Schistolaelaps mazzai*, Fonseca, 1960a:114.—Furman, 1971a:73. [synonymized].

A total of 14 females and 2 males of *Laelaps mazzai* was examined from Venezuela. With the

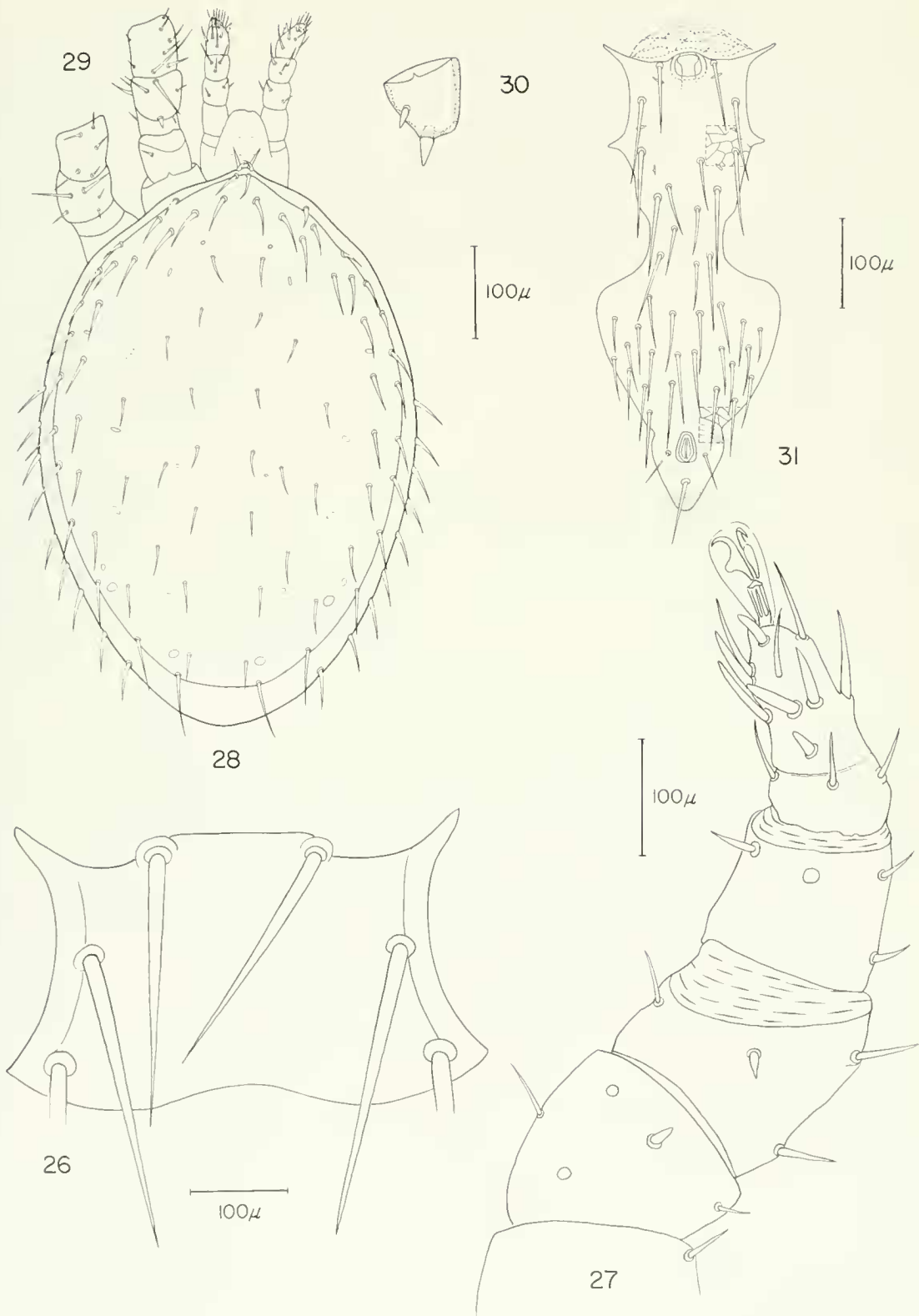


Fig. 26-31. 26-27, *Gigantolaelaps versteegi* (Oudemans): 26, sternal plate of female from Oudemans' original type material; 27, ventral view of leg II of type male. 28-30, *Laelaps manguinhos calvescens*, new subspecies: 28, dorsal view of idiosoma of female; 29, dorsal view of femur and genu I of female; 30, ventral view of coxa I of female. 31, *Laelaps mazzai* Fonseca: holoventral plate of male from *Calomys hummelincki*, Venezuela.

exception of 1 male from *Sigmodon hispidus*, all specimens were taken from 8 *Calomys hummelincki*. Infested hosts were collected at elevations ranging from 15 to 76 m. Five collections were made in the state of Monagas, 3 in Apure and 1 in Zulia.

Female specimens of *Laelaps mazzai* from Venezuela agree fairly closely with the lectotype as redefined by Furman (1971a). Comparative characters are given in Table 2. The Venezuelan forms vary in being slightly larger, with correspondingly larger dorsal, sternal, genitoventral and anal plates. An additional 2 females of *L. mazzai* from Bolivia loaned for study through the courtesy of Dr. R. W. Strandmann proved to be somewhat intermediate in characteristics between the lectotype and the Venezuelan specimens.

The 2 male specimens of *L. mazzai* differ rather markedly from the allotype as described by Fonseca. The anal plate is not separate from the ventral portion of the holoventral plate (Fig. 31), although marginal indentations of the holoventral plate are present just cephalad of the areas corresponding to the anterior shoulders of the anal plate of the female. Examination of the allotype indicated a very indistinct separa-

tion of anal and ventral portions of the holoventral plate, with more irregular margins than illustrated by Fonseca. I interpret this as indicative of an unstable character which may be evidenced by either a complete or incomplete holoventral plate in different populations of the same species. The number of setae of the male dorsal plate is only 152 to 188 in the 2 Venezuelan specimens, considerably fewer than seen in the allotype. The spermadactyl of the Venezuelan specimens is about 147  $\mu$  long, longer than the combined 2 basal segments of the chelicera; the structure was not visible on the allotype, but Fonseca (1959) reported the spermadactyl as only about 80  $\mu$  long in a specimen examined from *Proechimys iheringi denigratus* in northeastern Brazil.

The similarities between the type material of *L. mazzai* and the Venezuelan specimens are such that I consider them representative of a single species, attributing the differences to intraspecific variation. This stand is strengthened by the fact that the common host of the Venezuelan specimens is *Calomys hummelincki*. Fonseca (1959) reported *Hesperomys* (= *Calomys*) to be an extremely common host of *L. mazzai* in northeastern Brazil.

TABLE 2. *Laelaps mazzai* females

Character	Lectotype <i>L. mazzai</i>	Venezuelan <i>L. mazzai</i> <sup>*</sup>
Idiosoma length	684	805-865
Dorsal plate length/width	592/458	697-752/440-510
± dorsal plate setae	approx. 64 pairs	60-64 pairs
length j1	32	32-43
length j2	approx. 65	approx. 65
length J5	39	45-52
length Z5	-	107-121
Sternal plate length width	90/175	123-134/172-180
Genitoventral plate	132/166	145-166/171-177
length/width		
Anal plate length/width	90/94	98-115/103-110
Adanal setae length	-	50-56
Postanal seta length	-	80-96
Gnathosomal setae length	27	33-40
Inner hypostomal setae length	32	36-43
Femur I apicodorsal	72	65-85
seta length		
Genu I proximodorsal	108	97-110
seta length		
Coxa I proximal seta	48/8	40-43 8.5
length width		
Coxa I distal seta	32/6	33-38/6
length/width		

\*Range based on 5 specimens from *Calomys hummelincki*



*Laelaps nuttalli* Hirst*Laelaps nuttalli* Hirst, 1915:183.*Laelaps hawaiiensis* Ewing, 1924:118.*Haemolaelaps nuttalli* Turk, 1950:67.

A single collection of 3 female *L. nuttalli* was taken from *Rattus rattus* at Boca de Yaracuy, 35 km NW Puerto Cabello, Yaracuy, Venezuela on 8-X-65.

*Laelaps nuttalli* is a medium-sized *Laelaps* with the proximal seta of coxa I an elongate setiform, longer and slimmer than the distal spiniform seta. The genital setae are more closely spaced, or subequal in spacing to genitoventral setae IV; genitoventral setae II and III are more widely spaced, with setae III slightly the most widely spaced.

*Laelaps ovata* Furman*Laelaps ovata* Furman, 1972:41.

A total of 603 females of *Laelaps ovata* was examined from 119 infested hosts. The common host was *Oryzomys albigularis*; 484 females were taken from 87 of these hosts. The following hosts were found infested occasionally or once: *O. minutus*, *O. fulvescens*, *Rhipidomys venustus*, *Akodon urichi*, *Zygodontomys brevicauda*, *Thomasomys lugens*, *Calomys hummelincki*, *Neacomys tenuipes*, *Sigmodon hispidus*, *Rattus rattus*, *Heteromys anomalus*, *Marmosa fuscata*, *Monodelphis brevicaudata* and *Bradypus infuscatus*.

Infested hosts were taken at elevations ranging from 25 to 3200 m, but most collections were taken at elevations of 1200 to 2200 m. The states (or district) in which they were taken are listed in order of greatest to least frequency of infested hosts encountered: Dto. Federal, Merida, Trujillo, Tachira, Aragua, Miranda, Guarico, Yaracuy, Carabobo and Apure.

*Laelaps ovata* appears very similar to the species from Panama referred by Tipton et al. (1966) to *Laelaps thori* Fonseca, 1939. The common host of the Panamanian as well as the Venezuelan mites was *O. albigularis*. It is possible that the Venezuelan and Panamanian specimens represent only variants of *L. thori*, but examination of the holotype of Fonseca's species indicates otherwise. The type of *L. thori* is a larger mite, with the dorsal plate 678  $\mu$  long compared to 502 to 540 in *L. ovata*; the proximal seta of coxa I is a very slender setiform over 8 times longer than wide (43  $\mu$  x 5  $\mu$ ), compared to a strong setiform 3.5 to 6 times longer than wide in *L. ovata* (26 to 30  $\mu$  x 5 to

7  $\mu$ ); the gnathosomal setae are 32  $\mu$  long compared to only 13 to 18 in *L. ovata*. These and other differential features distinguishing the species are primarily representative of differences in size, but they represent not only discontinuous series but disproportionate size relationships.

*Laelaps paulistanensis* Fonseca

*Laelaps paulistanensis* Fonseca, 1936c:33.—Fonseca, 1959:132 [male described and illustrated].

*Laelaps hirsti* Fonseca, 1939b:117 and 139.—Fonseca, 1959:119 [syn].

A total of 1078 females, 30 males and 19 nymphs of *Laelaps paulistanensis* was identified from 140 infested hosts collected in Venezuela: 514 females, 16 males and 15 nymphs from 54 *Rhipidomys venustus*; 186 females and 10 males from 17 *R. venezuelae*; 128 females, 2 males and 4 nymphs from *R. couesi*; 11 females from 4 *R. caucensis*; 3 females from 3 *R. macconnelli*; 45 females, and 1 male from *Rhipidomys* sp.; 93 females from 31 *Oryzomys fulvescens*; 44 females from 1 *O. capito*; 11 females from 2 *Oryzomys* sp.; 1 to a few specimens each from *O. minutus*, *O. concolor*, *O. albigularis*, *Neacomys tenuipes*, *Thomasomys lugens*, *T. laniger*, *Akodon urichi*, *Sigmodon alstoni*, *Sigmodon hispidus*, "bird", *Glossophaga longirostris*, *G. soricina*.

Infested hosts were taken at elevations ranging from 1 to 3160 m. The most frequently infested host, *R. venustus*, was taken at higher elevations (from 1281 to 3160 m), most commonly in the state of Trujillo, followed by Monagas, Dto. Federal and Merida. The second most commonly infested host, *O. fulvescens*, was taken at lower elevations, (from 18 to 1260 m) in the states of Falcon, Monagas, Bolivar, Guarico and Zulia. Other states from which collections of *L. paulistanensis* were made are Tachira, Sucre, T. F. Amazonas, Miranda, Nueva Esparta, Lara and Barinas.

Specimens of *L. paulistanensis* collected in Venezuela range considerably in size beyond that given by Fonseca (1936c) and subsequently by Furman (1971a). The idiosoma of the female varies from 831 to 1080  $\mu$  long, and the dorsal plate varies from 750 to 981  $\mu$  long. In Fonseca's cotypes examined, seta j5 of the dorsal plate is 84  $\mu$  long, extending well past the base of seta z5, in contrast to his illustration. Series from Venezuela show that this is a variable characteristic in *L. paulistanensis*; specimens taken from 1 *O. fulvescens* have seta j5 varying from 46 to 85  $\mu$  long. Similarly the co-

types have coxa I with a stout, gradually tapered, blunt, proximal spine appreciably shorter than the piliform distal seta. In Venezuelan specimens the proximal spine retains its characteristic appearance, but varies from being appreciably shorter than the distal seta to subequal in length.

The males of Venezuelan *L. paulistanensis* agree with Fonseca's (1959) description except that setae Z5 of the dorsal plate are present and on the plate margin, in contrast to Fonseca's description, and there are about 6 extra submedian setae in the dorsal plate area between setae J1 and J5; setae j2 and j3 are longer than illustrated by Fonseca, in contrast to the shorter j4 to j6 pairs. The spermatheca is about 85  $\mu$  long, with a rather straight trunk and curved, tubular apex.

The closest relative of *L. paulistanensis* is *L. flexa*. Differential characters are considered in the discussion of the latter species and in the key to species of *Laelaps*.

*Laelaps pilifer* Tipton

(Fig. 32-37)

*Laelaps pilifer* Tipton, 1966:36 [Tipton, Altman, and Keenan].

A total of 295 *Laelaps pilifer* was examined from 48 infested hosts in Venezuela. The host-

parasite associations are as follows: 64 females, 7 males and 1 nymph from 11 *Neacomys tenuipes*; 26 females from 7 *Oryzomys albicularis*; 22 females and 2 males from 5 *O. concolor*; 83 females and 1 male from 8 *O. capito*; 7 females from 1 *O. macconnelli*; 29 females from 3 *O. fulvescens*; 10 females from 3 *O. minutus*; 5 females from 1 *Oryzomys* sp.; 3 females, 4 males and 1 nymph from 2 *Akodon urichi*; 21 females from 1 *Rhipidomys venezuelae*; 2 females from 2 *Zygodontomys brevicauda*; 1 female from 1 *Nectomys alfari*; 4 females from 1 *Rattus rattus*; and 2 females from unknown hosts.

*Laelaps pilifer* was taken from infested hosts at elevations ranging from 80 to 3270 m in the following states (or district), listed in order of greatest to least frequency of collection: Dto. Federal, Bolivar, Yaracuy, Zulia, Falcon, Merida, Monagas, Miranda, Aragua, Sucre, Trujillo.

A great range of morphological variation was seen in Venezuelan *L. pilifer*, varying from forms agreeing well with the original figures and description given by Tipton (1966) to forms with dorsal plate setae either minute in size or very long and coarse. Comparative data for the 3 major forms encountered are given in Table 3.

Specimens considered representative of typical *L. pilifer* were taken most frequently from *O. capito* and less commonly from *O. concolor*. Using setae j5 of the dorsal plate as a repre-

TABLE 3. *Laelaps pilifer* females from Venezuela

Character	Form "A"*	"Normal"***	Form "B"***
Idiosoma length	478-554	494-564	505-570
Dorsal plate	472-516/	456-530/	486-524
length/width	278-301	268-322	257-307
Extra seta on dorsal plate	no	no	yes
length j1	18-24	18-22	21-25
length j5	14.5-18	24-41	65-75
length J5	16-22	22-25	31-38
length Z5	45-66	61-69	67-82
Sternal plate	90-96/	76-94/	88-107
length/width	111-123	107-118	115-126
Genitoventral plate	118-124/	114-134/	98-113/
length/width	128-140	131-136	125-137
Adanal setae length	25-30	24-31	28-32
Postanal seta length	34-39	34-53	56-68
Gnathosomal setae length	15	14-21	18-24
Inner hypostomal			
setae length	30	24-30	27-38
Coxa I proximal seta	22-25	19-24/	21-25/
length/width	11-14	8-13	9-12
Coxa I distal seta length	16-18	16-22	18-23

\*Range of 5 specimens ex *Oryzomys concolor* and *Akodon urichi*

\*\*Range of 9 specimens ex *Oryzomys capito* and *O. concolor*

\*\*\*Range of 20 specimens ex *Oryzomys albicularis*, *O. minutus*, *O. concolor*, *Oryzomys* species and *Neacomys tenuipes*

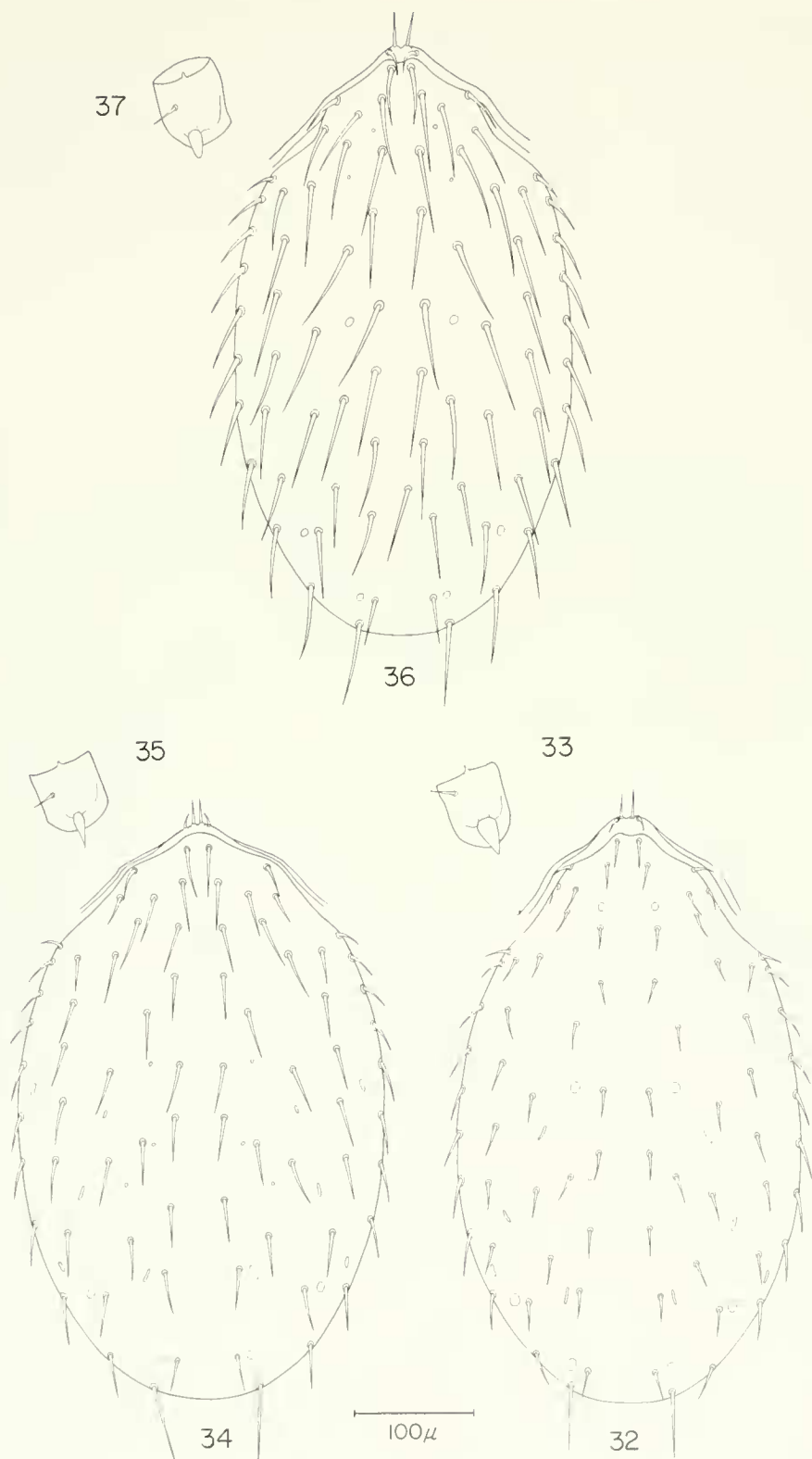


Fig. 32-37. *Laelaps pilifer* Tipton, dorsal plate and coxa I: 32-33. Form A from *Oryzomys concolor*; 34-35, normal form from *Oryzomys capito*; 36-37, form B from *Neacomys tenuipes*.



sentative index of setal length in the central area of the plate, the length varies from 32 to 43  $\mu$  in typical specimens (Fig. 34); in these forms the proximal seta of coxa I usually has the short, triangular, spiniform appearance typical of the species (Fig. 35), although occasional series are encountered in which the proximal seta has a short piliform tip.

Specimens considered as form A of *L. pilifer* were taken from *O. concolor* and *A. urichi*. In form A the central setae of the dorsal plate are very short and delicate; setae j5 range from 14 to 18  $\mu$  long (Fig. 32). In other respects form A agrees well with typical *L. pilifer*.

Specimens considered as form B of *L. pilifer* were taken from the following hosts, arranged in order of greatest to least frequency: *N. tenuipes*, *O. albicularis*, *O. minutus*, *O. fulvescens*, *Z. brevicauda*, *A. urichi*. In form B the central setae of the dorsal plate are elongate (Fig. 36); setae j5 are coarse and 67 to 75  $\mu$  long. In this form the proximal seta of coxa I is spiniform but much blunter than in either typical or form A specimens (Fig. 37).

It is primarily because of the apparent instability of characteristics in specimens of this complex which usually have been considered stable at the specific level that I have not established separate taxa for forms A and B. No two of the forms have been found in common on an individual host, although some occur on the same species of host in different geographical areas.

*Laelaps pilifer* is closely related to *L. castroi* from which it differs in its smaller size and in having the apicodorsal seta ADI of femur I stouter and longer than the proximodorsal seta PD3 of genu I, rather than having ADI of femur I smaller than, or subequal to, PD3 of genu I as in *L. castroi*; in *L. pilifer* the adanal setae arise well anterior to the caudal margin of the anus, while in *L. castroi* the adanal setae arise at the level of the caudal margin of the anus. Of the 3 forms of *L. pilifer* considered here, form B resembles most closely *L. castroi*, particularly in length of dorsal plate setae.

#### *Laelaps spicata* Furman

*Laelaps spicata* Furman, 1972:45.

*Laelaps spicata* is represented by 11 female specimens taken in Venezuela: 6 specimens from 3 *Oryzomys concolor*, 1 from *O. minutus*, 1 from *O. macconnelli* and 3 from 1 *Rhipidomys* sp. Collections were made at elevations of 135 to 2410 m in the states of Bolivar, Tachira and T. F. Amazonas.

*Laelaps spicata* is a small species for the genus with an ovate body and a dorsal plate 538 to 580  $\mu$  long by 322 to 360  $\mu$  wide, which covers most of the idiosoma. It is characterized by a prominent, spikelike proximal spine borne on a tubercle of coxa I, and a short, delicate piliform distal seta. Setae of dorsal and ventral plates very delicate and short; posterior terminal (Z5) and subterminal (J5) setal pairs of dorsal plate short and subequal. Postanal seta subequal to adanal setae or only slightly larger. Dorsal and ventral plates strongly reticulated.

*Laelaps spicata* shares several characters with *L. pilifer*, with which it was occasionally collected. It differs in many features, however, including the larger proximal spine of coxa I borne on a tubercle, scalelike markings of coxa I, smaller and more delicate body setae, lack of enlargement of dorsal plate setae Z5, or of the postanal seta, longer sternal plate and much stronger reticulation of both dorsal and ventral plates.

#### *Laelaps surcomata* Furman

*Laelaps surcomata* Furman, 1972:42.

*Laelaps surcomata* is represented by only 20 female specimens taken during the Venezuelan faunal survey from 8 *Rhipidomys macconnelli*. Infested hosts were taken at elevations between 750 and 1400 m during May and June 1966, 85 km SSE El Dorado, Bolivar state, Venezuela.

*Laelaps surcomata* is a rather large species for the genus, broadly ovate and with the dorsal plate 720 to 760  $\mu$  long by 400 to 458  $\mu$  wide, with moderate hypertrichy, 98 to 100 setae on dorsal plate, and with all coxal setae setiform. The proximal seta of coxa I is about 8 times longer than wide and over 1½ times longer than the distal seta. Leg I has very little enlargement of the dorsal setae of the femur and genu.

In size and general facies *L. surcomata* has a superficial resemblance to *L. paulistanensis*, with which it was occasionally found on *R. macconnelli*. It differs in many features, however, including size and shape of coxal setae, lack of enlargement of dorsal setae of femur and genu I, and hypertrichy of the dorsal plate.

#### Genus *Tur* Baker and Wharton

*Protonyssus* Turk, 1946:347.

*Tur* Baker and Wharton, 1952:85 (for *Protonyssus* Turk, not *Protonyssus* Trouessart, 1915).—Furman and Tipton, 1958:541 [re-description of genus].

Type Species: *Protonyssus uniscittatus* Turk.

*Tur* is composed of mites very closely related to *Laelaps*. Serious doubts have been raised as to its validity by Tipton et al. (1966), Strandtmann and Mitchell (1963) and Furman and Tipton (1961).

Study of specimens of 8 of the 9 species previously allocated to *Tur*, plus 3 new species described herein, provides the basis for retention of *Tur* as a valid genus, with some modification of the diagnostic criteria provided most recently by Garrett and Strandtmann (1967).

*Tur* is composed of small to large laelapines, with females ranging from 560 to 1350 microns in body length. Anal and genitoventral plates usually fused or in juxtaposition, the 2 regions bearing 3 and 8 setae respectively. Dorsal plate with 39 pairs of setae (1 species with an extra posteromedial seta). Broad extension of peritremalia posterior to stigmata. Female chelicerae partially or completely enveloped in a membrane, and the pseudosetae (arthrodial processes) at the base of the movable digit usually very long. Gnathosomal setae usually spiniform. Genu of leg IV with 9 setae. Chaetotaxy robust.

A distinctive feature separating *Tur* from *Laelaps* and close relatives is the chaetotaxy of

the legs of the females, which agrees completely with the holotrichous condition described for most free-living adult dermanyssoid mites by Evans and Till (1965). In *Laelaps* the leg chaetotaxy differs from the holotrichous condition in having 10 to 11 rather than 9 setae on the genu of leg IV.

Primary hosts of *Tur* species are hystrichomorph rodents of the family Echimyidae.

The diagnosis accepted here for *Tur* necessitates the transfer to the genus *Laelaps* of *Tur anomalus* Tipton 1966, and *Tur breviperitremus* Garrett and Strandtmann 1967. Both species have 10 setae on the genu of leg IV. Tipton's species also has small gnathosomal and hypostomal setae as typical of *Laelaps*. The details of the cheliceral structure are in doubt. Features which led Tipton to place his species in *Tur* included the juxtaposition of the genitoventral and anal plates and the existence of broad peritremalia. These characteristics are found in some species of both *Tur* and *Laelaps* and do not by themselves constitute diagnostic criteria. *L. breviperitremus* has chelicerae characteristic of *Laelaps* in lacking the enveloping membrane seen in *Tur*, and in having short arthrodial processes at the base of the movable digit.

Key to Species of *Tur*  
Females

1. Anal plate fused with genitoventral plate ..... 2  
  Anal plate separate from genitoventral plate ..... 5
2. Sternal setae extending well past posterior margin of sternal plate. Setae of coxae I long, uninflated. Large species, over 1000  $\mu$  body length ..... 3  
  Sternal setae not as above. Setae of coxae I swollen and shorter than width of coxa. Smaller, body length less than 900  $\mu$  ..... 4
3. Genu of leg I with posterodorsal seta 2 no longer than the segment and subequal to anterodorsal seta I and posterodorsal seta 1 of femur I. Dorsal plate lacking an extra seta between setae J4. .... *Tur amazonicus* Fonseca, 1960  
  Genu of leg I with posterodorsal seta 2-1½ times as long as the segment and much longer than anterodorsal seta I and posterodorsal seta 1 of femur I. Dorsal plate with an extra, strong seta between setae J4 ..... Form 2 of *Tur amazonicus*
4. Setae of coxa I and gnathosomal setae bulbous proximally, terminating in a fine apical filament. Trochanters III and IV each with an asymmetrically enlarged seta ..... *Tur apicalis* Furman and Tipton, 1961  
  Setae of coxa I and gnathosomal setae conically spiniform. Trochanters III and IV with all setae normal ..... *Tur uniseutatus* (Turk, 1946)
5. Gnathosomal setae, setae of coxa I, posterior setae of coxae II and III and setae AD1 of femora I and II modified into strong, blunt, striated, clublike processes ..... *Tur clavator*, new species  
  Setae not as above ..... 6
6. Gnathosomal setae bulbous or inflated proximally, terminating in a fine acuminate tip. Coxa I with 1 or both setae inflated basally and with fine acuminate tip ..... 7  
  Gnathosomal setae and setae of coxa I not as above ..... 8

7. Gnathosomal setae and both setae of coxa I bulbous proximally and terminating in a fine acuminate tip ..... Form 2 of *Tur apicalis*  
 Gnathosomal setae and distal seta of coxa I inflated proximally and terminating in a fine acuminate tip. Proximal seta of coxa I a long, slim setiform ..... *Tur subapicalis*, new species
8. Gnathosomal setae short, heavy, spiniform. Genitoventral setae not forming 2 straight diverging lines; fourth setal pair closer together than the third ..... *Tur aragaoi* (Fonseca, 1939)  
 Gnathosomal setae either strong or delicate, but not short, heavy, spiniform. Genitoventral setae forming 2 relatively straight diverging lines; fourth setal pair farther apart than the third ..... 9
9. Posterior margin of genitoventral plate clearly concave, conforming to the convex anal plate ..... 10  
 Posterior margin of genitoventral plate essentially straight or convex ..... 11
10. Sternal setae I not reaching posterior margin of sternal plate. Adanal setae reaching base of postanal seta. Setae J5 (subterminal setae of dorsal plate) minute ..... *Tur aymara* Fonseca, 1960  
 Sternal setae I extending well past posterior margin of plate. Adanal setae not reaching base of postanal seta. Setae J5 more than  $\frac{1}{2}$  as long as setae Z5 ..... *Tur turki* Fonseca, 1959
11. Genitoventral plate extending well posterior to insertion of setae IV, with posterior margin straight medially and in juxtaposition to anal plate. Setae J5 of dorsal plate minute, about  $\frac{1}{5}$  as long as setae Z5. Common on *Mesomys hispidus* ..... *Tur expansus*, new species  
 Genitoventral plate extending only slightly posterior to insertion of setae IV, with essentially straight posterior margin somewhat removed from anal plate. Setae J5 of dorsal plate over  $70 \mu$  long, about  $\frac{1}{2}$  or more as long as setae Z5 ..... *Tur lativentralis* (Fonseca, 1935)

*Tur amazonicus* Fonseca

(Fig. 38 and 39)

*Tur amazonicus* Fonseca, 1960a:117.

*Tur striatus* Furman and Tipton, 1961:200.—  
 Furman, 1971a:77 [synonymized].

A total of 237 females, 8 males and 4 nymphs of *T. amazonicus* was identified from 85 infested hosts collected in Venezuela: 162 females, 5 males and 3 nymphs from 54 *Proechimys guyannensis*, 45 females, 2 males and 1 nymph from 11 *P. semispinosus*; 25 females and 1 male from 15 *Proechimys* sp.; 1 female from 1 *Zygodontomys brevicauda*, 2 females from *Zygodontomys* sp. and 2 females from 1 *Marmosa murina*.

Typical specimens of *T. amazonicus* were taken on infested hosts at elevations ranging from 114 to 851 m, most commonly around 130 m. Most of the collections were made in T. F. Amazonas; a few were from the state of Bolivar. Two collections of 14 female specimens of an atypical population designated as Form 2 of *T. amazonicus* were taken from *P. hoplomoides* and *P. guyannensis* 85 km SE El Do-

rado, Bolivar state, at an elevation of 1032 m.

Form 2 of *T. amazonicus* differs from typical populations in having an extra unpaired seta on the dorsal plate between setae J4 (Fig. 38) and in having on the genu of leg I a very long proximodorsal seta (PD2) which is  $1\frac{1}{2}$  times the length of the segment (Fig. 38). In typical *T. amazonicus* this seta is subequal to—or shorter than—the genu. Form 2 also differs from typical populations in having more spiniform setae on the idiosoma.

DESCRIPTION

The following description is given of the previously undescribed males of *T. amazonicus* which were associated with typical females.

MALE: Idiosoma 912  $\mu$  long and 602  $\mu$  wide. *Dorsum*. Dorsal plate covering essentially entire idiosoma, 896  $\mu$  long, 600  $\mu$  wide, with 39 pairs of long, slim, flexible setae; representative setal lengths; j1 - 65  $\mu$  and barbed, j5 - 135  $\mu$ , j5 - 135  $\mu$ , Z5 - 295  $\mu$ ; distance between trichopores of setae j5 and z5 - 62  $\mu$ ; plate reticulated as in female. *Venter*. (Fig. 39). Holoventral plate entire, reticulated, abruptly expanded behind coxae IV, bordering posterior



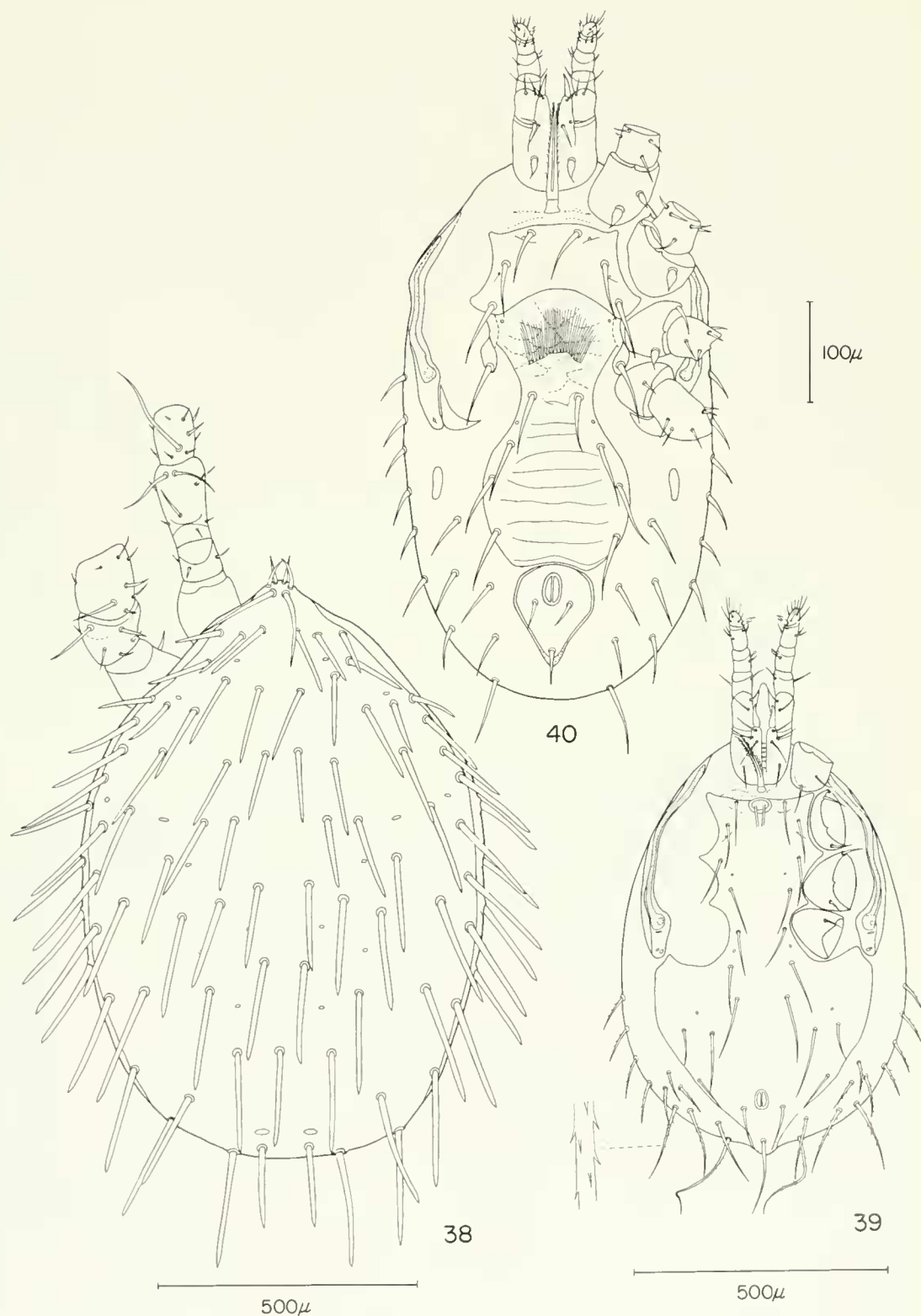


Fig. 38-40. 38-39, *Tur amazonicus* Fonseca: 38, dorsal view of form II female from *Proechimys guyannensis*, Bolivar state; 39, ventral view of male from typical population on *P. guyannensis*, T. F. Amazonas. 40. *Tur apicalis* Furman and Tipton, form II: ventral view of female from *Mesomys hispidus*, T. F. Amazonas.

margins of coxae and with anterior ventral width exceeding outer margins of coxae IV, posteriorly decreasing in width, as in the female; 750  $\mu$  long and 510  $\mu$  greatest width. Sternal setae I 104  $\mu$  long, extending  $\frac{2}{3}$  distance between setae II and III: Holoventral plate with 10 pairs of setae plus adanal pair and postanal seta; the latter 3 setae of similar form and arrangement to that of female. About 10 pairs of lightly barbed setae on unarmed opisthogaster varying from 63 to 270  $\mu$  long. *Gnathosoma*. Spermadactyl elongate, tubular, longer than combined length of basal segments of chelicera, apically coiled in  $1\frac{1}{2}$  revolutions; fixed digit a short, triangular membranous lobe with small pilus dentilis near its base; movable digit elongate, delicate, membranous, bifurcate near tip. Gnathosomal setae slim, setiform, 50  $\mu$  long, extending to bases of inner hypostomal setae; latter about 60  $\mu$  long. Deutosternal groove with 5 rows of 3 to 4 denticles each. *Legs*. Legs I and IV of subequal length, 870 to 890  $\mu$  to tip of caruncle; legs II and III shorter, about 760  $\mu$  long; legs II stoutest. All coxal setae slim, setiform. Many leg setae delicately barbed. Leg chaetotaxy normal as in females.

The description of the male of *T. amazonicus* is based on 7 specimens from 4 *Proechimys guyannensis*, 1 *P. semispinosus* and 1 *Proechimys* sp. taken in T. F. Amazonas, Venezuela on the Río Manapiaré, San Juan, at Tamatama, Río Orinoco and Casiquiare Canal, Capibara. Representative specimens will be deposited in the collections indicated elsewhere in this paper as repositories of type series.

*Tur apicalis* Furman and Tipton  
(Fig. 40)

*Tur apicalis* Furman and Tipton, 1961:197.

A total of 1277 females, 149 males and 57 nymphs of *T. apicalis* was identified from 146 infested hosts in Venezuela; 1149 females, 396 males and 50 nymphs from 93 *Proechimys guyannensis*, the most common host; 79 females, 32 males and 2 nymphs from 23 unidentified *Proechimys* sp.; 8 females and 3 males from 5 *P. semispinosus*; 3 females and 1 male from 4 *Zygodontomys brevicauda*; 1 female from *Didelphis marsupialis*; 1 female from *Sciurus igniventris*; 2 females and 1 male from 2 *Philander opossum*; 1 female from *Marmosa cinerea*; 1 male from *Mesomys* sp. Several collections from hosts other than *Proechimys* probably represent accidental associations.

Infested hosts were taken at elevations ranging from 43 to 851 m, but most were found at

elevations less than 150 m. Most (114) of the infested hosts were taken in T. F. Amazonas; lesser numbers (26) were taken in the state of Bolívar, particularly in the southern section of the state.

Specimens of *T. apicalis* referred to above fit the original description and figures very well with the exception that setae J5 of the dorsal plate average about 31  $\mu$  long rather than 16  $\mu$  as originally described.

In addition to the typical population of *T. apicalis*, 1 specimen designated as Form 2 of *T. apicalis* was taken from *Mesomys hispidus*, 138 m elev., Río Mavaca, T. F. Amazonas. This may well represent a new species, but since only a single female specimen was taken, it is considered here as an aberrant form of *T. apicalis* occurring on an abnormal host.

Form 2 (Fig. 40) differs from typical *T. apicalis* in smaller size (idiosoma 564  $\mu$  long by 290  $\mu$  wide; dorsal plate 500  $\mu$  long by 279  $\mu$  wide) with correspondingly smaller ventral sclerotized plates, by having the anal plate separate from the genitoventral plate, and by the presence of normal setae on trochanters of legs III and IV only. Form 2 of *T. apicalis* is also closely related to *T. subapicalis* from which it differs in smaller size and in having both proximal and distal setae of coxa I bulbous with fine acuminate tip.

*Tur aragaoi* (Fonseca)  
(Fig. 41-43)

*Laelaps aragonensis* Fonseca, 1939b:108.—Fonseca, 1958, in litt [emended to *Laelaps aragaoi*].

*Tur aragaoi*, Furman and Tipton, 1958:544.

A total of 159 females and 23 males of *T. aragaoi* was identified from 62 infested hosts collected in Venezuela: 109 females and 13 males from 34 *Proechimys guyannensis*; 10 females and 4 males from 8 *P. semispinosus*; 32 females and 6 males from 13 *Proechimys* species; 1 to 2 females each from single specimens of *Calomys hummelincki*, *Echimyus armatus*, *Mesomys hispidus*, *Didelphis marsupialis*, *Artibeus jamaicensis*, *A. pumilis* and *Didelphus scutatus*.

Infested hosts were taken at elevations ranging from 130 to 851 m, but most were found at elevations of less than 150 m. Fifty-one infested hosts were collected in T. F. Amazonas, 10 from the state of Bolívar and 1 from the state of Monagas.

Most of the Venezuelan specimens of *T. aragaoi* agree quite well with the original description and figures, differing slightly in having

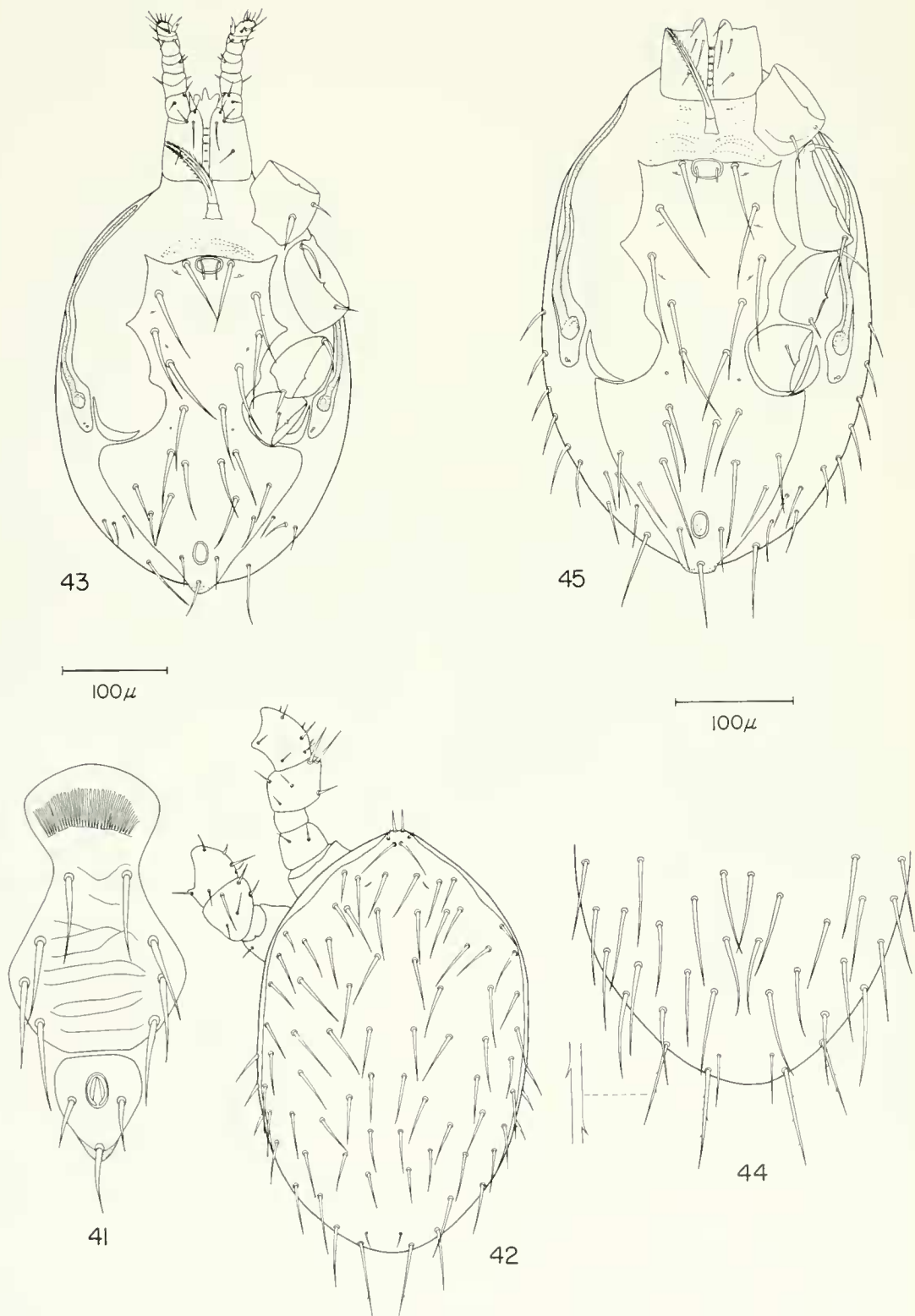


Fig. 41-45. 41-43, *Tur aragaoi* (Fonseca): 41, genitoventral and anal plate of female from *Proechimys* sp.; 42-43, dorsal and ventral views respectively of male from *Proechimys guyannensis*. 44-45, *Tur aymara* Fonseca, male from *Proechimys guyannensis*. 44, posterior end of dorsal plate; 45, ventral view of idiosoma.



longer and slimmer setae on the genitoventral plate and usually in having that plate widest at the level of setae III rather than at a level between setae III and IV. The size of the proximal spine on coxa I varies considerably in different specimens from the usual size of  $33\ \mu$  long by  $11\ \mu$  wide to  $38\ \mu$  long by  $16\ \mu$  wide. Four female specimens show variation from the majority of Venezuelan *T. aragaoi* in the size and shape of the genitoventral plate; the plate shape varies from only slightly concave posteriorly to straight (Fig. 41) and the plate in 1 specimen is only  $166\ \mu$  long by  $177\ \mu$  greatest width (length measured from anterior edge of genital setae trichopores to posterior median margin of plate). This compares with a length of  $193\ \mu$  and width of  $209\ \mu$  in typical specimens. The variant forms were taken from *Proechimys*, together with typical *T. aragaoi*, as well as with other species of *Tur*.

#### DESCRIPTION

The following description is given of the previously undescribed male of *T. aragaoi*.

**MALE:** General facies of male similar to that of *T. apicalis* but no coxal setae are inflated and the setae of trochanters III and IV are all normal. Idiosoma  $392\ \mu$  long and  $231\ \mu$  wide. **Dorsum.** Dorsal plate covering essentially entire idiosoma,  $386\ \mu$  long,  $231\ \mu$  wide; widest at shoulders over coxae II; with 39 pairs setae well-developed, slender, except for setae z1 and J5 which are delicate, minute (Fig. 42); representative setal measurements: j5 -  $49\ \mu$ , J5 -  $13\ \mu$ , Z5 -  $59\ \mu$  (longest setae of body); distance between trichopores of setae j5 and z5 -  $42\ \mu$ . **Venter** (Fig. 43). Holoventral plate entire, reticulated, abruptly expanded behind coxae IV, bordering posterior margins of coxae IV but not extending lateral of outer coxal margins; length  $316\ \mu$ , maximum width  $147\ \mu$ . Sternal setae 1  $67\ \mu$  long, reaching almost to bases of setae III. Holoventral plate with 10 pairs of setae plus adanals and postanal seta. Adanal setae, slender,  $31\ \mu$  long, arising about at mid-level of anus; postanal seta  $42\ \mu$  long. About 5 pairs setae on unarmed opisthogaster varying from 25 to  $55\ \mu$  long. **Gnathosoma.** Chelicerae including spermatidactyl as in *T. apicalis*. Gnathosomal setae delicate, setiform,  $16\ \mu$  long; inner hypostomal setae delicate, setiform,  $25\ \mu$  long, reaching just to base of gnathosomals. **Legs.** Legs IV longest, about  $400\ \mu$  long to tip of caruncle. Coxa I with proximal seta slim, spiniform,  $31\ \mu$  long, 5 to  $6\ \mu$  wide; distal seta coxa I setiform, strong,  $23\ \mu$  long; posterior seta coxa II setiform, strong,  $25\ \mu$  long; posterior seta coxa III spiniform, slim,  $18\ \mu$  long. Femur of leg I with dorsoapi-

cal setae AD1 and PD1 enlarged, about  $38\ \mu$  long; genu of leg I with dorsoproximal setae AD3 and PD3 small, and PD2 only slightly enlarged. Genu of leg IV with 9 setae.

*Tur aymara* Fonseca

(Fig. 44, 45)

*Tur aymara* Fonseca, 1960a:121.

*Tur schistoventralis* Furman and Tipton, 1961: 203.—Garrett and Strandtmann, 1967:245. [synonymized].

A total of 498 females, and 51 males of *T. aymara* was identified from 71 infested hosts collected in Venezuela: 264 females and 29 males from 27 *Proechimys semispinosus*; 21 females and 5 males from 12 *P. guyannensis*; 189 females and 16 males from 21 *Proechimys* sp.; and 1 to 2 females each from a variety of rodents and bats. The latter associations are regarded as contaminants.

Infested hosts were taken at elevations ranging from 130 to 851 m, but most were found at elevations of less than 150 m. Sixty infested hosts were collected in T. F. Amazonas, 8 from the state of Bolivar, and 1 from Apure state. Both the common host, *P. semispinosus*, and the geographic distribution of *T. aymara* were shared with *T. aragaoi*.

#### DESCRIPTION

Females of *T. aymara* collected in Venezuela agree closely with those described from Bolivia by Fonseca (1960a). The previously unknown male is described below.

**MALE:** General facies as in male of *T. aragaoi* but all coxal setae except posterior seta of coxa III slim, setiform. Dorsal plate (Fig. 44) with setae J5 (posterior subterminal setae) relatively long, almost  $\frac{1}{2}$  as long as setae Z5 (posterior terminal setae). Idiosoma oval,  $462\ \mu$  long,  $290\ \mu$  wide. **Dorsum.** Dorsal plate covering essentially entire idiosoma; with 39 pairs setae well-developed, slender, setiform; representative setal measurements: j1 -  $30\ \mu$ ; j5 -  $72\ \mu$ ; J5 -  $37$  to  $43\ \mu$ ; Z5 -  $80$  to  $86\ \mu$ ; distance between trichopores of setae j5 and z5 -  $37\ \mu$ . **Venter.** (Fig. 45). Holoventral plate entire, reticulated, abruptly expanded behind coxae IV but not extending lateral of outer coxal margins; length  $360\ \mu$ , maximum width  $191\ \mu$ . Sternal setae 1  $72\ \mu$  long, reaching almost to bases of setae III. Holoventral plate with 10 pairs setae plus adanal pair and postanal seta. Adanal setae slender,  $40\ \mu$  long, arising posterior to mid-level of anus and extending posterior to base of postanal seta; latter  $62\ \mu$  long. About 5 pairs setae on unarmed

opisthogaster varying from 37 to 77  $\mu$  long. *Gnathosoma*. Chelicerae as in *T. apicalis*. Gnathosomal setae delicate, setiform, 18  $\mu$  long; inner hypostomal setae similar to gnathosomals but 24  $\mu$  long, extending almost to bases of gnathosomals. *Legs*. Legs IV longest, 478  $\mu$  to tip of caruncle. Coxa I with proximal seta slim, setiform, 37  $\mu$  long; distal slim, setiform seta 30  $\mu$  long. Posterior seta of coxa II subequal to proximal seta coxa I. Posterior seta coxa III short, strong, setiform, 22  $\mu$  long. Femora of legs I and II with dorsoapical setae AD1 and PD1 enlarged, PD1 slightly larger, 50  $\mu$  long; genua of legs I and II with dorsoproximal setae AD3 and PD3 small, PD2 larger, 32  $\mu$  long. Genu of leg IV with 9 setae.

*Tur clavator*, new species

(Fig. 46-49)

DIAGNOSIS OF FEMALE

A small elongate-oval species; idiosoma 700  $\mu$  long, 308  $\mu$  wide. Dorsal plate narrowly rounded posteriorly; anal plate separate. Fourth pair of genitoventral setae more closely spaced than third pair. Genitoventral plate slightly expanded behind coxae IV, almost linguiform. Following setae modified into strong, striated, club-shaped spines: setae of coxae I, posterior setae of coxae II and III, AD1 of femora I and II.

DESCRIPTION

**FEMALE:** *Dorsum* (Fig. 47). Dorsal plate 568  $\mu$  long, 248  $\mu$  wide, widest over coxae II and tapering to narrowly rounded posterior margin leaving broad posterior and posterolateral areas of dorsum unarmed; surface reticulated; 38 pairs setae present in usual pattern; setae z1 absent; marginal setae of s, S and r series minute. Representative dorsal plate setal lengths: j1 - 27  $\mu$ , j5 - 49  $\mu$ , J5 - 8  $\mu$ , Z5 - 55  $\mu$ , S5 - 12  $\mu$ ; distance between trichopores of setae j5 and z5 - 35  $\mu$ . Unarmed portion of dorsal opisthosoma with finely striated cuticula, bearing about 9 pairs of minute setae. *Venter*. (Fig. 46). Sternal plate of modified trapezoid shape, wider posteriorly, anterior margin slightly convex, lateral margins concave but diverging posteriorly to obtusely angulate posterolateral projections; posterior margin concave; 100  $\mu$  long on midline and 130  $\mu$  wide at level of setae II; surface with reticular pattern. Sternal setae I 57  $\mu$  long extending past bases of setae II by about  $\frac{1}{3}$  of their length; trichopores separated by 55  $\mu$ ; setae III 62  $\mu$  long with trichopores separated by 134  $\mu$ . Genitoventral plate narrowly elongate, extending almost to anal plate; 178  $\mu$  long from

anterior margins of trichopores of genital setae to posterior margin of plate; maximum width 112  $\mu$  just posterior to second pair setae; surface striations predominantly transverse; of 4 pairs setae the genital are longest, reaching almost to level of setae II and set more closely together than other setae of plate; setae IV more closely approximated than II and III. Anal plate of inverted, narrowly pyriform shape, 92  $\mu$  long, 61  $\mu$  wide; adanal setae arising at mid-level of anus, 21  $\mu$  long, extending less than  $\frac{1}{2}$  distance to postanal seta; latter delicate, 25  $\mu$  long. Metapodal platelets rodlike, 34  $\mu$  long. Unarmed opisthogaster with 4 pairs minute, delicate setae. Peritremata extending to level of posterior  $\frac{1}{4}$  of coxae I; broad extension of peritremalia extending behind stigmata to level of posterior margins of coxae IV, not fused with parapodal platelets. *Gnathosoma*. (Fig. 48 and 49). Chelicerae normal for genus with long membrane partially enclosing chelae, and arthrodial processes elongate, setiform; fixed chela bifid apically and with prominent, curved, setiform pilus dentilis; movable chela with pointed, inward curving tip and a subapical tooth. Hypostomal cornicles membranous. Gnathosomal setae modified into club-shaped, longitudinally striated, heavily sclerotized processes 16  $\mu$  long, 9.3  $\mu$  wide. Hypostomal setae normal, inner pair longest, 26  $\mu$ . Deutosternal groove with 5 or 6 rows of 3 to 7 denticles each. *Legs*. Coxa I with club-shaped proximal seta 15  $\mu$  long, 10  $\mu$  wide; distal seta similar but smaller. Posterior setae of coxae II and III subequal in size and shape to proximal seta of coxa I. Anterior setae of coxae II and III strong, setiform. Seta of coxa IV a minute setiform. Club-shaped setae AD1 of femora of legs I and II similar to proximal spine of coxa I but smaller. Most leg setae minute, delicate. Leg chaetotaxy normal for genus; genu IV with 9 setae.

**TYPE DATA:** Holotype ex *Proechimys guyanensis* (E. Geoffroy) (SVP 7354), Río Supamo, 50 km SE El Manteco, Bolivar state, 150 m elev., 4-IV-66, collected by the Tuttle team. One paratype has the same collection data as the type. Three paratypes were taken from *Proechimys hoplomyoides*, 85 km SSE El Dorado, Bolivar state, 10-V-66, by the Tuttle team.

*Tur expansus*, new species

(Fig. 50-53)

DIAGNOSIS OF FEMALE

A small, oval species with general facies of *T. lativentralis*, with separate anal plate but

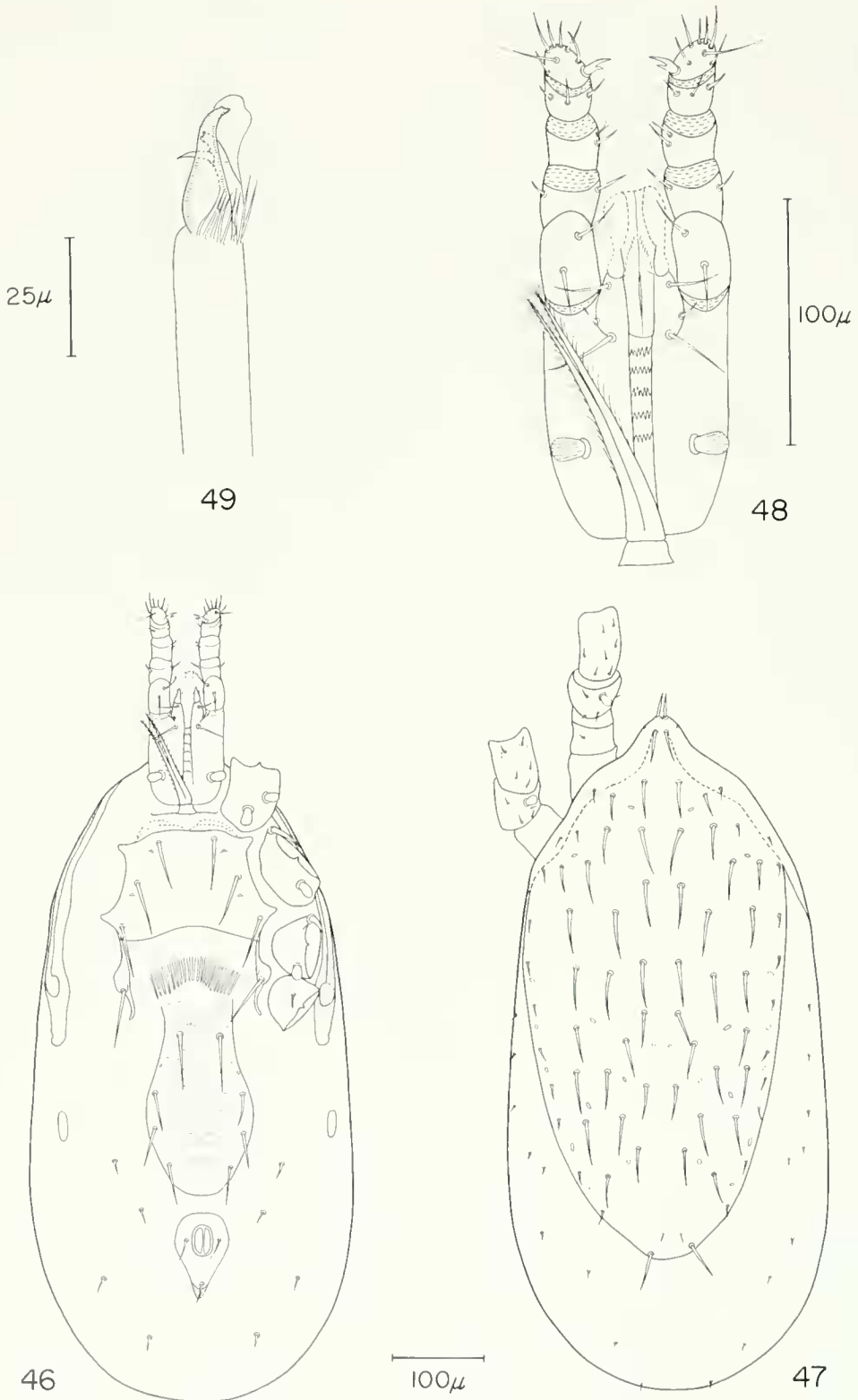


Fig. 46-49. *Tur clavator*, new species, female from *Prochimys guyannensis*: 46, ventral view; 47, dorsal view; 48, gnathosoma and tritosternum; 49, chelicera.



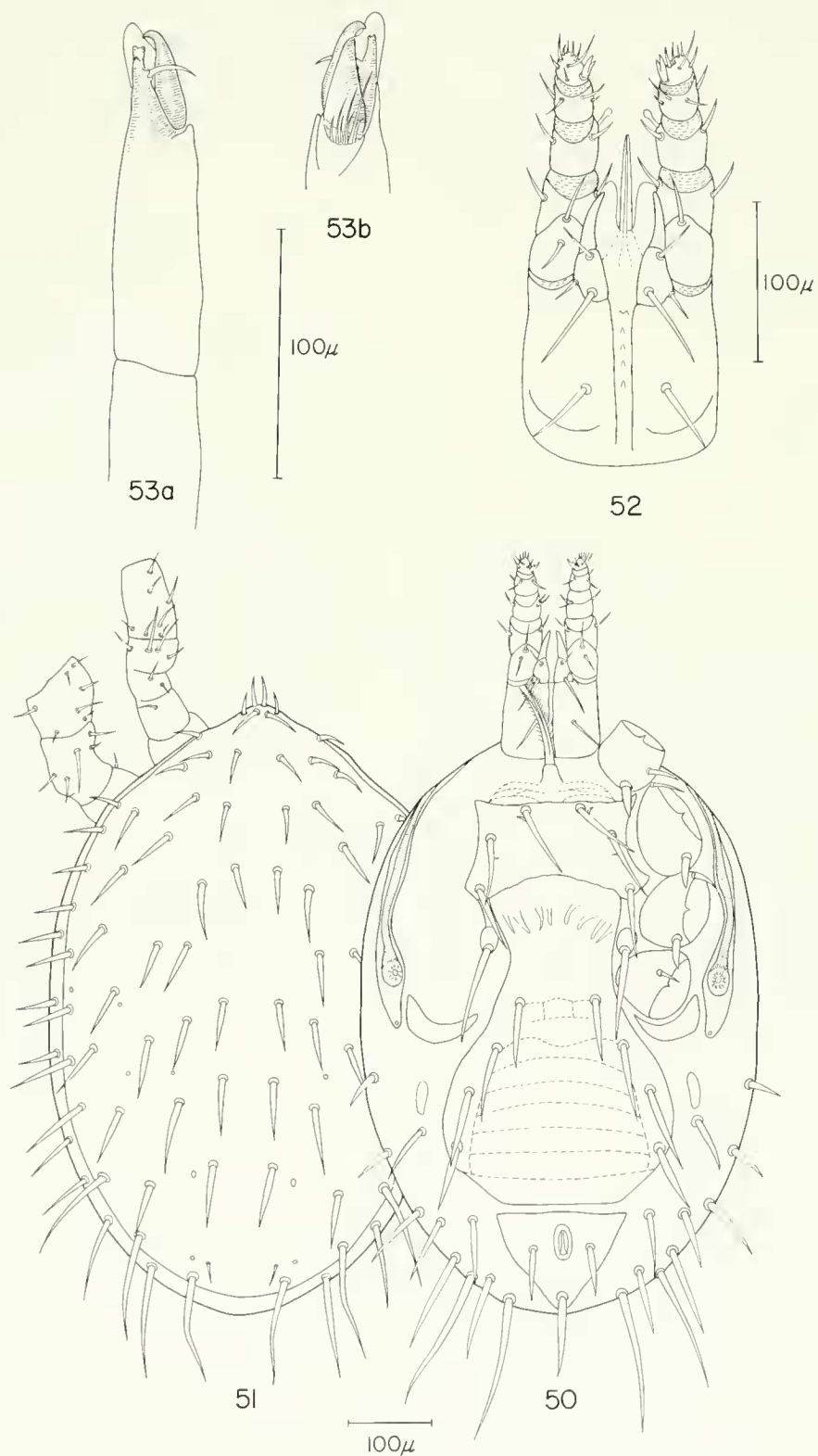


Fig. 50-53. *Tur expansus*, new species, female from *Mesomys hispidus*: 50, ventral view; 51, dorsal view; 52, gnathosoma; 53, chelicera.

with broadly expanded genitoventral plate more convexly rounded posteriorly and with setae J5 of dorsal plate minute. Idiosoma 724  $\mu$  long and 489  $\mu$  wide.

#### DESCRIPTION

**FEMALE:** *Dorsum* (Fig. 51). Dorsal plate 666  $\mu$  long, 456  $\mu$  wide, covering all but narrow lateral and posterior margins of idiosoma; surface reticulated; 39 pairs of setae present in usual pattern; setae typically relatively strong, coarse basally but tapered to very fine tip; representative setal lengths: j1 - 27  $\mu$ , j5 - 54  $\mu$ , J5 - 16  $\mu$ , Z5 - 123  $\mu$ ; distance between trichopores of setae j5 and z5 - 38  $\mu$ . Marginal row of idiosomal setae strong, straight, varying from 46  $\mu$  long anteriorly to 150  $\mu$  posteriorly. *Venter* (Fig. 50). Sternal plate relatively short in relation to width, anterior margin essentially straight, lateral margins concave and posterior margin deeply concave; length on midline 82  $\mu$ , width at level of setae II 172  $\mu$ ; plate with lightly reticulated surface. Sternal setae 1 just reach or slightly surpass posterior margin of plate and trichopores separated by 58  $\mu$ ; setae III almost 100  $\mu$  long and with trichopores separated by 167  $\mu$ . Genitoventral plate broadly expanded behind coxae IV to a greatest width of 274  $\mu$  at level between setae III and IV; length of plate from anterior level of genital setae trichopores to posterior margin of plate 250  $\mu$ ; plate extended behind setae IV to straight margin in juxtaposition with anal plate; 4 pairs of setae strong and located well within the boundaries of the plate, arranged in 2 diverging rows with setae IV the most widely spaced; setae III displaced slightly exterior to the line of setae from I through IV; genital setae 85  $\mu$  long, reaching well beyond bases of setae II; surface of plate with pattern of predominantly transverse striae. Anal plate triangular with straight anterior margin; length about 122  $\mu$ , greatest width 134  $\mu$ ; adanal setae arise at mid-level of anus, 61  $\mu$  long reaching to postanal seta, which is stronger and about 87  $\mu$  long. Metapodal plates small, elongate and narrow. Peritremata extend to anterior level of coxae I. Peritremalia moderately broad and extending well posterior to stigmata. About 5 pairs of strong, strictly ventral setae on unarmed opisthogaster plus several marginal setae. *Gnathosoma* (Fig. 52 and 53). Chelicerae normal for genus; movable chela without teeth but with pointed apex incurved at a right angle; fixed chela distally bifid and with a small subapical tooth distal to insertion of prominent, curved, setiform pilus dentilis; chelae partially enveloped by a membrane; arthrodial processes sub-

tending base of movable chela well-developed, extending to or beyond mid-level of chelae. Gnathosomal setae 38  $\mu$  long, strong, setiform. Inner hypostomal setae 46  $\mu$  long, not reaching bases of gnathosomals. Deutosternal groove with 6 rows of 1 to 3 teeth per row. *Legs*. Coxa I with proximal seta elongate, striated, spiniform with short acuminate tip, 34  $\mu$  long and 7  $\mu$  wide; distal seta slender, setiform, 37  $\mu$  long. Posterior seta of coxa II and III similar to proximal seta of coxa I but that of coxa III somewhat smaller. Femur of leg I with setae ADI and PD1 moderately enlarged, about 43  $\mu$  long, appreciably larger than PD2 of genu I. AD3 and PD3 of genu I much smaller than PD2. Leg chaetotaxy typical of genus.

Only the female of *T. expansus* is known with certainty.

**TYPE DATA:** Female holotype and 3 paratypes ex *Mesomys hispidus* (Desmarest) (SVP 17214) SW Río Mavaca, 84 km SE Esmeralda, T. F. Amazonas at 138 m elev., 5-III-67. One paratype from the same host collected 20-II-66 at 185 m elev., Boca Mavaca, T. F. Amazonas. Other paratypes taken from *M. hispidus* collected at 138 m elev., 10 km up Río Mavaca from Boca Mavaca, T. F. Amazonas are as follows: 4 on 5-III-67, 3 on 6-III-67, 2 on 16-III-67; 1 paratype was taken at the same location on 17-III-67 from *Proechimys semispinosus*. From *M. hispidus* 14 paratypes were taken at Río Manavichi about 84 km SE Esmeralda, T. F. Amazonas, 138 m elev., 20-III-67, and 6 paratypes from 7 km down Casiquiare Canal from Capibara, T. F. Amazonas, 138 m elev., 7-VI-67. A male which is probably *T. expansus* was taken with the latter collection.

#### *Tur subapicalis*, new species

(Fig. 54-56)

#### DIAGNOSIS OF FEMALE

A small oval species with idiosoma 700  $\mu$  long and 430  $\mu$  wide. Anal plate separate from genitoventral plate. Fourth pair of genitoventral setae more closely spaced than third pair. Genitoventral plate widely expanded behind coxae IV. Gnathosomal and distal setae of coxa I inflated basally and with fine acuminate tip. Proximal seta of coxa I long, slim, setiform. Setae J5 of dorsal plate minute.

#### DESCRIPTION

**FEMALE:** *Dorsum* (Fig. 55). Dorsal plate 670  $\mu$  long and 376  $\mu$  wide, covering most of idiosoma; surface with reticular pattern; 39 pairs of

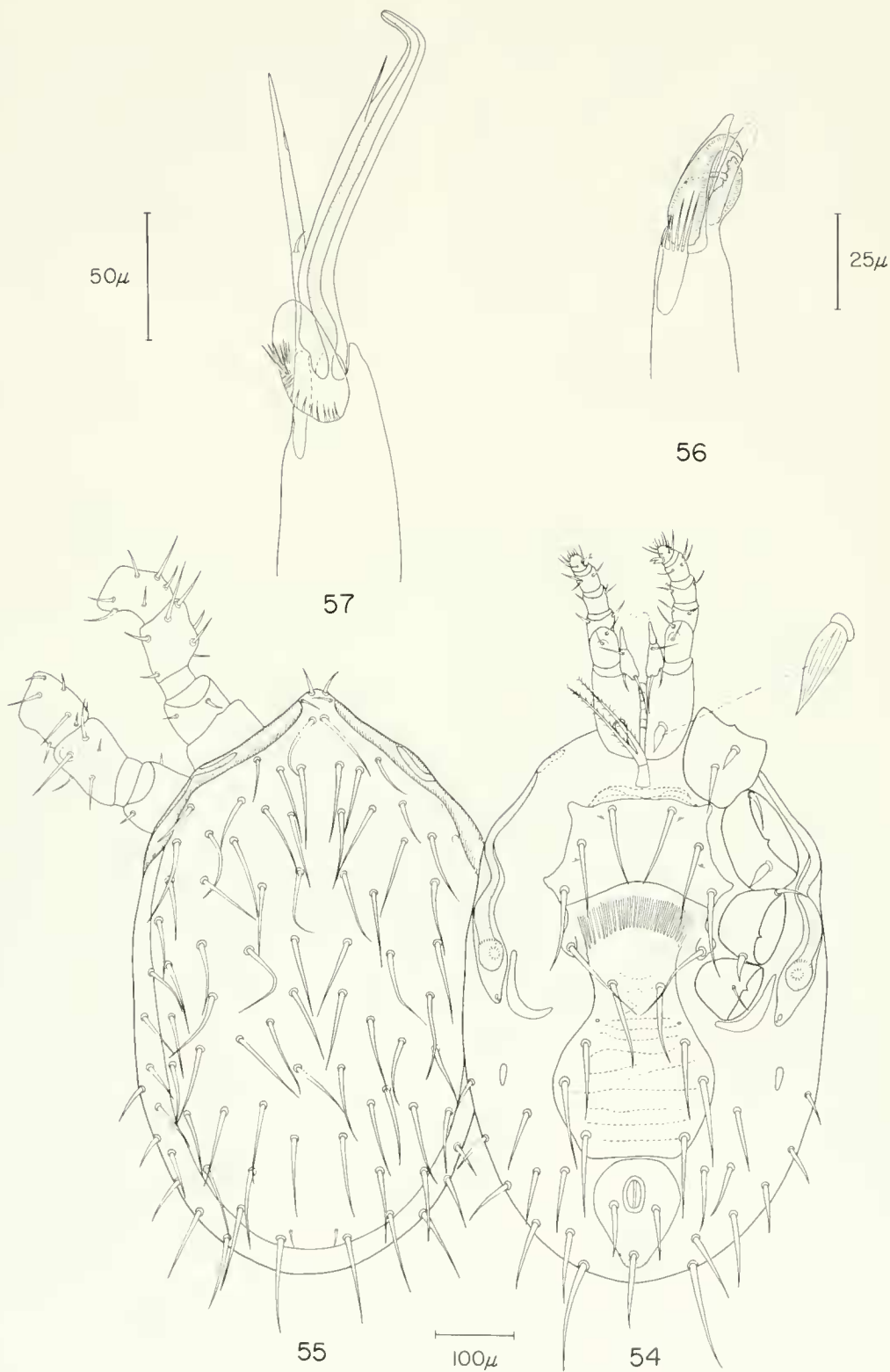


Fig. 54-57. *Tur subapicalis*, new species. female from *Procchimys guyannensis*: 54, ventral view; 55, dorsal view; 56, chelicera. 57, *Mysolaelaps heteronychus* Fonseca: chelicera of male.



slender setae in usual arrangement; representative setal lengths:  $j1 - 39 \mu$ ,  $j5 - 97 \mu$ ,  $J5 - 19 \mu$ ,  $Z5 - 123 \mu$ ; distance between trichopores of setae  $j5$  and  $z5 - 43 \mu$ . Posterior marginal setae of dorsal plate and idiosoma minutely barbed. Dorsolateral and posterior marginal setae of idiosoma strong but slightly smaller than adjacent setae of dorsal plate. *Venter* (Fig. 54). Sternal plate of modified trapezoid shape, wider posteriorly, anterior margin slightly convex, lateral margins concave but diverging posteriorly, and posterior margin concave;  $100 \mu$  long on midline and  $170 \mu$  wide at level of setae II; surface with reticular pattern. Sternal setae I  $97 \mu$  long, just reaching posterior margin of plate and with trichopores separated by  $64 \mu$ ; setae III  $103 \mu$  long with trichopores separated by  $166 \mu$ . Genitoventral plate transversely striated, moderately expanded posterior to coxae IV to greatest width of  $188 \mu$  at level of genitoventral setae III; length of plate from anterior margins of genital setae trichopores to posterior margin of plate  $215 \mu$ ; posterior margin of plate straight to convex. Genitoventral setae IV more closely spaced than setae III; all setae of plate elongate, setiform, with first pair  $98 \mu$  long, reaching level about  $\frac{2}{3}$  distance between bases of setae II and III. Anal plate relatively narrow, of inverted pyriform shape,  $126 \mu$  long and  $103 \mu$  wide; adanal setae arising at level of posterior end of anus,  $67 \mu$  long, reaching just past base of postanal seta which is stronger and  $93 \mu$  long. Metapodal plates small, elongate, narrow. Peritremata extend to mid-level of coxae I. Peritremalia broad and with broad extension posterior to stigmata. Unarmed opisthogaster with 5 pairs of strictly ventral setae and several submarginal to marginal setae. *Gnathosoma*. Chelicerae (Fig. 56) normal for genus with long membrane partially enclosing chelae and with relatively elongate arthrodial setiform processes arising at base of movable chela. Fixed chela bifid apically and with prominent, curved, setiform pilus dentilis. Movable chela lacking teeth but with pointed tip curved inward at right angle. Gnathosomal setae  $32 \mu$  long, striated, with bulbous base over  $9 \mu$  wide and with slender acuminate tip. Inner hypostomal setae  $54 \mu$  long, slim, setiform. Deutosternal groove with about 6 rows of indistinctly visible teeth. *Legs*. Coxa I with proximal seta slim, striated, spiniform,  $55 \mu$  long by basal width of  $6 \mu$ ; distal seta  $32 \mu$  long, somewhat inflated basally, striated, spiniform, with acuminate tip. Posterior setae of coxae II and III inflated, striated, spiniform, with acuminate tip; lengths  $37$  and  $33 \mu$  respectively. Femur of leg I with dorsoapical setae enlarged; AD1 -  $51 \mu$  long, PD1 -  $63 \mu$  long; genu

with proximodorsal setae AD3 and PD3 short, about  $20 \mu$ , but PD2 long,  $59 \mu$ . Femur and genu of leg II with relative strengths of setae as described for leg I. Leg chaetotaxy normal for genus.

Only the female of *T. subapicalis* is known with certainty.

**TYPE DATA:** Holotype and 4 paratypes ex *Proechimys guyannensis* (E. Geoffroy) (SVP 16400), at Belén, Río Cunucumuna, T. F. Amazonas at 150 m elev. From the same host species and locality were taken 4 paratypes on 3-1-67, 1 paratype on 4-1-67, and 7 paratypes on 17-1-67; with the latter were taken 2 males which probably are *T. subapicalis*. Additional collections of *T. subapicalis* are as follows: 4 females taken 2-1-67 from same host species and locality as holotype; 1 female, 4-1-67 from the same location on *Zygodontomys brevicauda*; 1 female, 19-IX-67 from *P. guyannensis* at 114 m elev., Paria, 25 km SSE Puerto Ayacucho, T. F. Amazonas; 1 female and 1 male (?), 5-VII-67, from *Proechimys* sp. at 155 m elev., San Juan, Río Manapiare, T. F. Amazonas.

Included with the collections of *T. subapicalis* were *T. apicalis* and *T. aragaoi*, both of which bear resemblance to *T. subapicalis*. There seems a definite possibility that some described species of *Tur* may prove on further study to represent hybrid forms, but morphological differences are such that colonization studies or the discovery of more complete intergradation would be necessary to verify this possibility.

*T. subapicalis* differs from *T. apicalis* in having the anal plate separate from the genitoventral plate, a feature which only rarely varies (see discussion of Form 2 of *T. apicalis*), in having the proximal seta of coxa I setiform instead of bulbous, and in lacking asymmetrically enlarged setae on trochanters of legs III and IV. *T. subapicalis* differs from *T. uniscutatus* in having a separate anal plate, bulbous gnathosomal setae with acuminate tips and genitoventral setae IV more closely spaced than III. It differs from *T. aragaoi* in having the posterior margin of the genitoventral plate straight to convex.

#### Genus *Mysolaclaps* Fonseca

*Mysolaclaps* Fonseca, 1936a:17.

Type Species: *Mysolaclaps parvispinosus* Fonseca

*Mysolaclaps* consists of large laelapid mites found primarily on ericetid rodents of the tribe Hesperomyiini. The idiosoma of *Mysolaclaps* is

usually over 1150  $\mu$  long with dorsal plate covering almost entire dorsum. Setae of dorsal plate of female minute to small except for anterior and posterior marginals. Genitoventral plate of female large, expanded behind coxae IV, with broadly rounded to concave posterior margin; with 4 pairs of marginally located setae but fourth pair at times located just off posterior margin of plate. Coxae with setiform setae. Leg chaetotaxy as described by Evans and Till (1965) for most holotrichous free-living der-

manyssoid mites, except that genu IV has 10 rather than 9 setae.

Of the 3 known species of Neotropical *Mysolaelaps*, all are represented in the currently reported Venezuelan collections. *Laelaps rothschildi* Hirst, 1914, a species virtually host specific for murid rodents of the genus *Melomys* in Australia and New Guinea may belong in the genus *Mysolaelaps*, as suggested by Fonseca (1959), but its placement remains inconclusive pending further study.

#### Key to Neotropical Species of *Mysolaelaps*<sup>4</sup> Females

1. All genitoventral setae minute, approximately equal in size. Legs 2 to 4 each with gross enlargement of I of the paired ambulacral claws .... *M. heteronychus* Fonseca, 1959  
At least 1 pair genitoventral setae 65  $\mu$  or longer, 4th pair much longer than 1st pair.  
Legs 2 to 4 each with paired ambulacral claws subequal ..... 2
2. All sternal setae small, approximately equal in size. First and 2nd pairs genitoventral setae less than  $\frac{1}{2}$  length of 3rd and 4th pairs ..... *M. microspinosus* Fonseca, 1936  
Third pair sternal setae approximately twice as long as 1st pair. First and 2nd pairs genitoventral setae more than  $\frac{1}{2}$  length of 3rd and 4th pairs .....  
..... *M. parvispinosus* Fonseca, 1936

#### *Mysolaelaps heteronychus* Fonseca

(Fig. 57)

*Mysolaelaps heteronychus* Fonseca, 1959:145.

A total of 1292 females, 2 males and 2 nymphs of *M. heteronychus* was identified from 154 infested hosts collected in Venezuela. Species of *Rhipidomys* were the most common hosts. Fifty-eight *R. venustus* yielded 523 mites; 24 *R. venezuelae* yielded 306 females and 1 male, and 32 *R. macconnelli* yielded 154 specimens. *R. caucensis* and *R. couesi* were less frequently found infested. Hosts found infested on 2 to 4 occasions each include *Oryzomys minutus*, *O. albigularis*, and *O. capito*. Several other cricetine rodents were found infested on single occasions as were man, marsupials, bats and a bird. These are regarded as accidental associations.

*M. heteronychus* was collected at elevations ranging from 4 to 3270 m, a reflection of its capacity to thrive on hosts such as *R. venezuelae* at low elevations and *R. venustus* at higher elevations. The states or regions from which the mite was collected, listed in order of greatest to least frequency, are: T. F. Amazonas, Tachira, Trujillo, Bolivar, Falcon, Monagas, Merida, Dto. Federal, Sucre, Nueva Esparta, Lara and Barinas.

Females of *M. heteronychus* from Venezuela

agree well in most respects with Fonseca's original description (1959). The first pair of genitoventral plate setae is well inside the lateral margins of the plate and not marginal as illustrated by Fonseca; setae 2 through 4 may be strictly marginal or may appear just off the plate on the striated cuticula. This is most frequently the case with setae 4.

#### DESCRIPTION

The following description of the male of *M. heteronychus* represents the first description of a male of this genus. Males have been found rarely on hosts and presumably are almost exclusively nest inhabitants.

**MALE:** General facies similar to that of female; a large mite with complete holoventral plate, small central setae on dorsal plate and vestigial claws on legs I. Idiosoma 1047  $\mu$  long and 725  $\mu$  wide. **Dorsum.** Dorsal plate covering idiosoma; most setae broken on the single male available for description, but marginal setae well developed: setae j1 - 67  $\mu$  long, j5 - 40  $\mu$ , j5 - 49  $\mu$ , S5 - 180  $\mu$  long. Distance between trichopores of setae j5 and z5 - 110  $\mu$ . **Venter.** Holoventral plate entire, reticulated; lateral margins with deep concavities opposite each of coxae II to IV and widely expanded behind coxae IV to level of outer margins of coxae, thence diminished in width in a convex arc to posterior extremity. Setae I of holoventral

<sup>4</sup>Modified from Furman and Tipton, 1961

tral plate broken but much slimmer than setae II; setae II through IV each reach well beyond trichopores of next posterior setal pair. In addition to 5 pairs setae in podosomal region, holoven-tral plate bears 10 pairs of trichopores in opisthogastric area as well as 3 anal setae (all opisthogastric setae broken or missing). Peritremata slim, extending anteriorly to mid-level of coxae II. Peritremalia slim, not extending posterior to stigmata, but pair of small pores present posterior to stigmata as in female. *Gnathosoma*. Chelicera (Fig. 57) with sper-madactyl about 150  $\mu$  long, tubular, of decreas-ing diameter distally and curved in a gentle to acute arc; apparently flexible, partially fused basally with membranous movable digit which extends 5/6 length of spermadactyl with free setalike tip. Fixed digit straight, bristlelike, about  $\frac{1}{2}$  as long as spermadactyl and with dor-sal seta on proximal  $\frac{1}{4}$ . Arthrodial membrane well developed with short, setalike arthrodial processes. Gnathosomal setae small, 33  $\mu$  long; inner hypostomal setae 59  $\mu$  long, extending to bases of gnathosomal setae. Deutosternal groove with 12 rows of 2 to 4 denticles each. *Legs*. Relative size of legs as in female. All coxal setae setiform. Small anterodorsal spur on coxa II. Claws of legs II to IV normal, but those of tarsi I vestigial. Dorsoapical setae AD1 of femur I somewhat enlarged, 61  $\mu$  long. Proximodorsal setae of genu I not enlarged. Setae AD1 and PD1 of femur II subequal, 40 to 43  $\mu$  long. Genu IV with 10 setae.

The male is described from a single speci-men taken from *Rhipidomys venezuelae* (SVP 24206) together with 12 female *M. heteronychus* on 1-VIII-68, by the Peterson team at Cerro Santa Ana, 49 km N and 32 km W Coro, Fal-con, Venezuela.

#### *Mysolaclaps microspinosus* Fonseca

*Mysolaclaps microspinosus* Fonseca, 1936a:18.—Fonseca, 1959:144 [Figures].

A total of 69 females of *M. microspinosus* was identified from 33 infested hosts collected in Venezuela: 48 from 26 *Oryzomys minutus*, 18 from 4 *Oryzomys* sp., 1 each from *Rhipi-domys macconnelli*, *Thomasomys laniger* and a bird.

*M. microspinosus* was found primarily at high elevations of over 2400 m, with collections ranging in elevation from 1400 to 3540 m. The states from which the mite was collected, listed in order of greatest to least frequency, are: Merida, Tachira, Sucre, Trujillo and T. F. Ama-zonas.

#### *Mysolaclaps parvispinosus* Fonseca

*Mysolaclaps parvispinosus* Fonseca, 1936a:17.—Fonseca, 1959:151 [Figures].

A total of 206 females of *M. parvispinosus* was identified from 77 infested hosts collected in Venezuela: 187 from 69 *Oryzomys fulvescens*, 7 from 3 *Oryzomys* sp., 2 from 1 *Neacomys tenu-ipes*, 1 from *Zygodontomys brevicauda*, 1 from *Heteromys anomalus*, 5 from 1 *Cavia porcellus* and 3 from 1 *Molossus ater*.

*M. parvispinosus* was collected at elevations ranging from 1 to 1977 m, with most of the specimens taken at less than 1500 m elevation. The states (or district) from which the mite was collected, listed in order of greatest to least frequency, are: Monagas, Bolivar, Falcon, Cara-bobo, Sucre, Miranda, Lara, Zulia, Guarico, Dto. Federal.

#### Genus *Hymenolaclaps*, new genus

##### DIAGNOSIS (BASED ON FEMALE)

Dorsal and ventral armature weakly sclero-tized. Dorsal plate covering most of idiosoma, with 37 pairs of minute to small setae. Trito-sternum well developed with fimbriated lacin-iae. Genitoventral plate truncate posteriorly, with 3 pairs setae. Peritremata slim with peritre-malia poorly developed and not fused with parapodal plates. Tectum (Fig. 59b) strongly fimbriated and elongated. Movable digit of chelicera with minute tooth; fixed digit mem-branous. Hypostome with prominent transverse striations. Deutosternum with 6 rows of 3 to 4 denticles per row. Genu of leg IV with 9 setae. Tibiae of legs III and IV with 8 setae.

Type Species: *Hymenolaclaps princeps*, new species

#### *Hymenolaclaps princeps*, new species

(Fig. 58-61)

##### DIAGNOSIS

As for genus.

##### DESCRIPTION

**FEMALE:** Idiosoma narrowly oval, 572  $\mu$  long, 344  $\mu$  wide. Dorsal plate (Figure 59a) weakly sclerotized, covering essentially entire idiosoma, 561  $\mu$  long, 344  $\mu$  wide; bearing 37 pairs of small, delicate setae in pattern typical of *Laclaps* but lacking setae z1 and z2; repre-sentative setal lengths: j1 - 19  $\mu$ , j5 - 6  $\mu$ , J5 - 13  $\mu$ , Z5 - 21  $\mu$ ; distance between trichopores of j5 and z5 - 43  $\mu$ . A single row of about 11 mar-ginal idiosomal setae slightly larger than adja-cent setae of dorsal plate. *Venter* (Fig. 58). Sternal plate 101  $\mu$  long on midline and 133  $\mu$



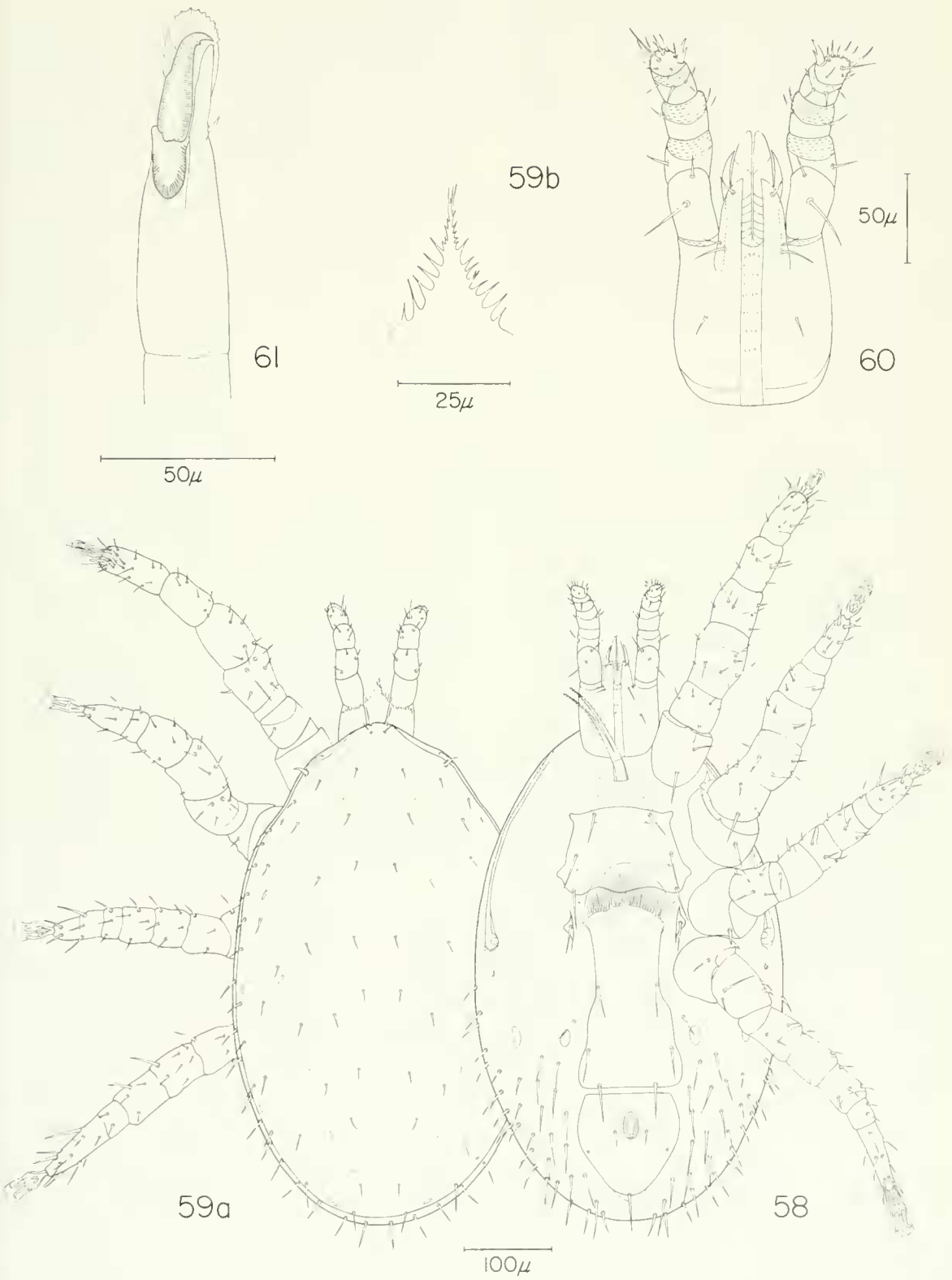


Fig. 58-61. *Hymenolaelaps princeps*, new genus, new species, female from *Thomasoniys lugens*: 58. ventral view; 59a. dorsal view; 59b. tectum; 60. gnathosoma; 61. chelicera.

wide at level setae II, lightly sclerotized, roughly trapezoidal, anterior margin slightly convex, lateral margins slightly concave and diverging posteriorly to obtusely angulate posterolateral lobes bearing third pair of setae; posterior margin with median projection and 2 submedian indentations; plate with usual 3 pairs setae and 2 pairs of lyriform pores; setae I arising on anterior margin, 37  $\mu$  long, not extending to bases of setae II and with bases of setae I separated by 61  $\mu$ . Metasternal setae subequal to sternal setae I and arising from boomerang-shaped metasternal platelets. Genitoventral plate urn-shaped, broadly truncate posteriorly; lateral margins convexly swollen posterior to genital setae, indented at level of setae II and swollen to maximum width between setae II and III; 122  $\mu$  long from anterior level of genital setae trichopores to posterior margin; greatest width 126  $\mu$ ; setae I 35  $\mu$  long reaching  $\frac{1}{2}$  distance to bases of setae II; setae I and II arising on lateral margins, setae III on posterior margin; setae II more widely spaced than other setae of plate; pair of flanking setae on unarmed cuticula between seta I and II of genitoventral plate. Anal plate a modified broad pyriform with anterior margin straight; length subequal to width and subequal to greatest width of genitoventral plate. Adanal setae set at level of posterior  $\frac{1}{4}$  of anus, 25  $\mu$  long, reaching about  $\frac{1}{3}$  of distance to postanal seta; latter 44  $\mu$  long. Metapodal platelets sausage-shaped, 25  $\mu$  long; a pair of similar but smaller platelets near genitoventral plate margins at level of metapodal platelets. Peritremata thin, extending to anterior  $\frac{1}{3}$  of coxae I. Peritremalia with slim, poorly sclerotized posterior extension including a subterminal pore behind stigmata. Unarmed opisthogaster with about 25 pairs setae, larger posteriorly to maximum length of 44  $\mu$ . *Gnathosoma* (Fig. 60 and 61). Chelicerae with movable digit well developed, with minute subapical tooth and with tip curved and terminating in sharp point. Arthrodial processes subtending base of movable digit in an elongate oval arrangement. Fixed digit membranous with small dorsal seta near its base; membrane extends distal to movable digit with prominently rayed distal crown resembling the feathered headdress of an American Indian chieftain. Deutosternal groove with 6 rows of 3 to 4 denticles per row and with additional scattered denticles apically. Gnathosomal setae delicate, 10  $\mu$  long; inner hypostomal setae 14  $\mu$  long, longer than outer and distal hypostomals. Palpal chaetotaxy formula 2, 5, 6, 12. *Legs*. All coxal setae setiform except anterior spiniform seta of coxa III and the weakly spiniform anterior seta of coxa II. Coxa I with

proximal seta 34  $\mu$  long; distal seta 21  $\mu$  long. Coxa II with a well-developed anterodorsal spur. Femur of leg I with apical pair of dorsal setae enlarged; AD1 about 30  $\mu$  long, PD1 - 43  $\mu$  long; genu of leg I with seta PD2 - 22  $\mu$  long.

Chaetotaxy of legs given in Table 4. Deficiency noted only on tibia IV which has 8 rather than the 10 setae normally found in holotrichous freeliving dermanyssoid mites.

TYPE DATA: Female holotype and 2 paratypes ex *Thomasomys lugens* (Thomas) (SVP 4442), Middle Refugio, 5 km E and 1 km S Tabay, Merida, Venezuela, 2710 m elev., 15-IV-66 by the N. Peterson team. Other paratypes, all females, are: 17 from 3 *T. hylophilus* 35 km S and 22 km W San Cristobal, Tachira at 2400 m elev.; 4 from 3 *T. aureus* from the same locality at 2385 m elev.; 4 from 2 *Thomasomys* sp. 5.5 km E and 2 km S Tabay, Merida at 2580 and 2670 m elev.; 1 from *Proechimys guyanensis* at El Manaco, 59 km SE El Dorado, Bolivar at 150 m elev.; 1 from *Oryzomys* sp. and 1 from *Caenolestes* sp. 35 km S and 22 km W San Cristobal, Tachira at 2400 m elev.

*H. princeps* is intermediate in characteristics between laelapid and macronyssid mites and has several characteristics in common with the macronyssid *Liponyssella madagascariensis* (Hirst) from lemurs of Madagascar. The latter differs in numerous basic features, however, such as a single column of deutosternal teeth, well-developed fixed digit of chelicera with 2 terminal hyaline processes, macronyssine type of dorsal plate with much reduction of dorsal plate setation, and fusion of peritremalia with parapodal plates.

TABLE 4.  
Leg chaetotaxy of *Hymenolaelaps princeps*

	I	II	III	IV
Coxa	2	2	2	1
Trochanter	6	5	5	5
Femur	13	11	6	6
Genu	13	11	9	9
Tibia	13	10	8	8

*Hymenolaelaps* bears a superficial resemblance to *Neolaelaps* Hirst, 1926, a genus of laelapid mites found only on fruit-eating bats in the Australian and Oriental zoogeographic realms. *Neolaelaps* differs in numerous features, including very large peritreme, long dorsal plate setae, including setae z1 and z2, presence of some spiniform coxal setae, corniculi lacking

or indistinct in female, and 10 or more rows of deutosternal teeth in single or double file. The genus *Chrysoschorolaelaps* Evans and Till, 1965a, also resembles *Hymenolaelaps* superficially. It is distinguished by its hyaline, flap-like hypostomal corniculi, strong retrose spurs on basis capituli, lack of setae z3 and px series on dorsal plate, hypertrophied setae of coxae 1 and 2, smooth tectum and tibia IV with 10 setae. Resemblances of *Hymenolaelaps* to the above genera are not supportive of common ancestry. The new genus represents an instance of independent evolution of elongate, non-grasping, weakly toothed chelae in the Laelapinae.

### Genus *Steptolaelaps* Furman

*Steptolaelaps* Furman, 1955:519.

Type Species: *Neolaelaps heteromys* Fox

The 2 known species of *Steptolaelaps* are found primarily on heteromyid rodents. The geographic distribution ranges from the Neotropical region northward to Texas in the United States. The genus is distinguished from all other laelapid genera on the basis of the following combination of characters: 3 pairs of setae on the genitoventral plate of the female; robust spines on coxae I to III and on the trochanter and femur of leg I; strong spines on the dorsum; simple lobate tectum; chelicerae of both sexes each with a large, toothed, movable digit opposed to a reduced, simple fixed digit and with elongate arthrodial processes. Leg chaetotaxy corresponds exactly to the holotrichous condition described for free-living dermanyssoid mites by Evans and Till (1965).

### *Steptolaelaps heteromys* (Fox)

*Neolaelaps heteromys* Fox, 1947:119.

*Steptolaelaps heteromydis* Furman, 1955:521.

*Steptolaelaps heteromys*. Furman and Tipton, 1961:195.

A total of 840 females, 550 males and 80 nymphs of *S. heteromys* was identified from 142 infested hosts collected in Venezuela. The common host was *Heteromys anomalus*: 113 hosts yielded 773 females, 523 males and 77 nymphs. From 5 *Heteromys* sp. there were taken 37 females, 16 males and 2 nymphs. From 7 *Zygodontomys brevicauda* there were taken 11 females, 5 males and 1 nymph. One to 4 mites each were taken from a wide variety of other rodents, bats, a marsupial, an edentate and a bird; these are considered accidental associations.

Hosts infested with *S. heteromys* were taken at elevations ranging from 5 to 2126 m. The states (or district) from which they were collected, listed in order of greatest to least frequency, are: Sucre, Falcon, Dto. Federal, Trujillo, Miranda, Yaracuy, Aragua, Monagas, Guarico, Barinas, Zulia, T. F. Amazonas.

Specimens of *S. heteromys* showed little morphological variation, agreeing well with the figures and description given by Furman (1955) and Tipton et al. (1966).

*S. heteromys* is the only species of the genus known from Venezuela. It differs from *S. liomydis* (Grant) in that the movable digit of the female chelicera bears 2 teeth in addition to the terminal prong, and 6 long arthrodial processes arise from the base of the digit, while in *S. liomydis* there is only 1 tooth on the movable digit and 1 long and 1 short arthrodial processes. Among other differential features, the gnathosomal setae of *S. heteromys* are long and tapering, while in *S. liomydis* they are short, thick spines, resembling those of coxae I.

### Genus *Neoparalaelaps* Fonseca

*Neoparalaelaps* Fonseca, 1937:58 [= *Paralaelaps* Fonseca, 1936b, preoccupied by *Paralaelaps* Tragardh, 1908].

Type Species: *Neoparalaelaps bispinosus* (Fonseca)

The Neotropical, monotypic genus *Neoparalaelaps* is considered here as a member of the subfamily Hirstionyssinae Evans and Till 1966. In most respects, the genus fits well in the subfamily and more particularly shows similarities to *Patrinysus* Jameson 1950. It differs from the diagnosis of the subfamily given by Herrin (1970) only as follows: in the female, the movable digit of the chelicerae is toothed and the fixed digit bears a relatively large ribbonlike process which has been described as a pilus dentilis but could be interpreted as a hyaline process; dorsal shield is hypotrichous but less so than typical for Hirstionyssinae, bearing 32 to 35 pairs of setae in the female, including a vestigial pair of setae z1; chaetotaxy of legs normal except that genu IV bears 11 setae.

### *Neoparalaelaps bispinosus* (Fonseca)

(Fig. 62-66)

*Paralaelaps bispinosus* Fonseca, 1936b:29.

*Neoparalaelaps bispinosus*, Fonseca, 1937:58.

A total of 9 females and 4 males of *N. bispinosus* was identified from Venezuela: 8 fe-

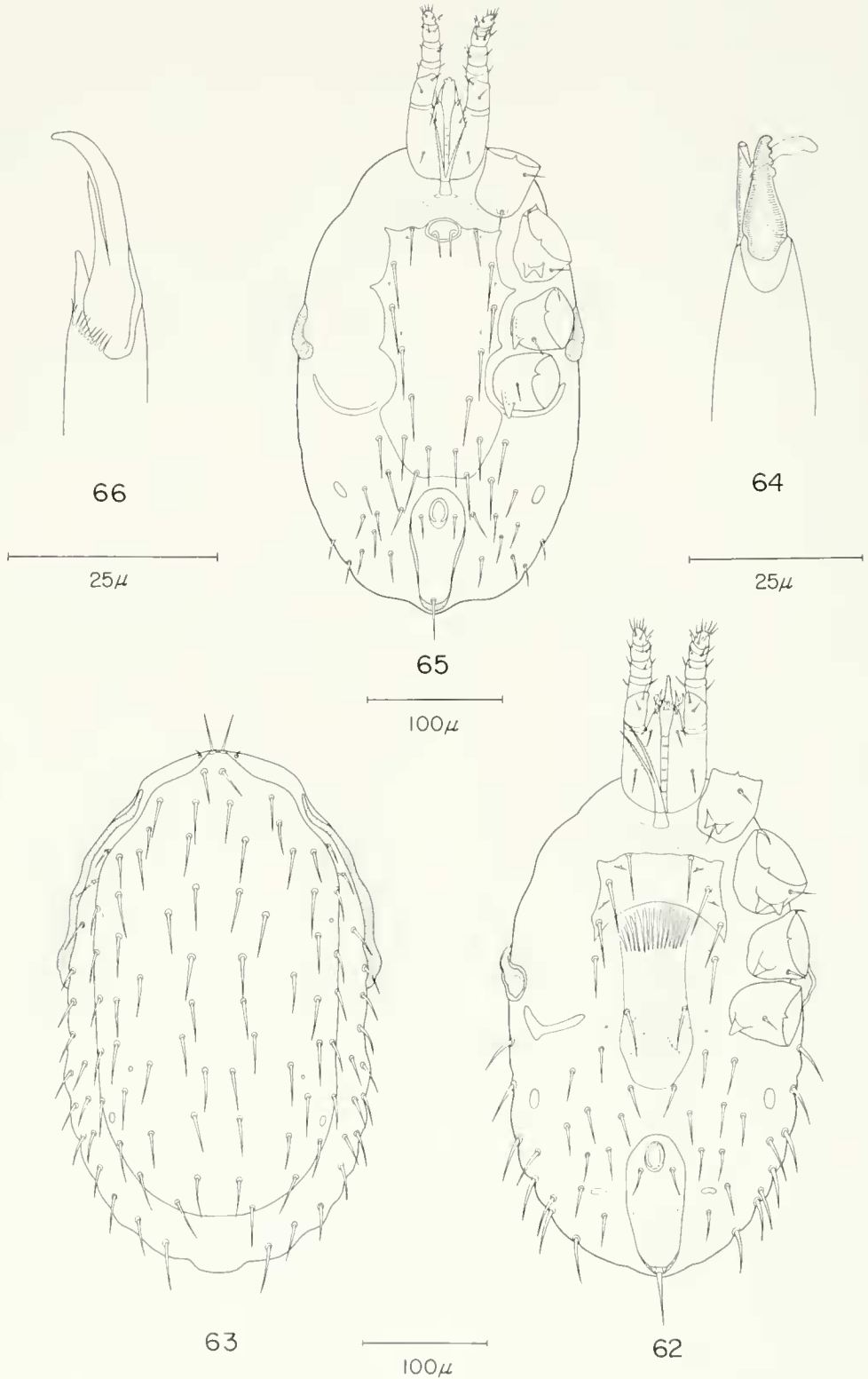


Fig. 62-66. *Neoparalaelaps bispinosus* (Fonseca), from *Cavia porcellus*, Monagas state; 62, ventral view of female; 63, dorsal idiosoma of female 64, chelicera of female; 65, ventral view of male; 66, chelicera of male.



males and 4 males were taken from 3 hosts (2 *Cavia porcellus* and 1 *Molossus ater*) at San Agustín, 3 km N and 4 km W Caripe, Monagas, 1180 m elev., June and July 1967; 1 female was taken from *C. porcellus* at the Hato San Fernando, 2 km N and 2 km W Caripe, Monagas, 1180 m elev., 14-VI-67.

The females of *N. bispinosus* taken in Venezuela agree reasonably well with Fonseca's original description and figures. The Venezuelan specimens differ in that the sternal plate is more shallow than given by Fonseca, measuring about 42  $\mu$  long on midline by a width at level of setae II of 94  $\mu$ ; there are only 10 instead of 12 pairs of strictly ventral setae on the unarmed opisthogaster (Fig. 62); the 2 elongate platelets noted by Fonseca between the metapodals and coxae IV are not evident; the dorsal plate bears 35 pairs of setae instead of the 34 described by Fonseca, but of these the minute pair z1 and pairs r3 and r4 are actually off the plate, with a basal sclerotized connecting strip to the plate. Setae s1, s2, r1, r2, r6 and px3 are absent (Fig. 63). Other characteristics noted on Venezuelan female specimens are as follows. Tectum membranous, an irregularly rounded lobe. Movable digit of chelicera with 3 teeth (Fig. 64); arthrodial processes not visible; fixed digit with large, membranous, ribbonlike pilus dentilis. Peritremata broad, moving dorsally over coxae III and extending dorsally to level of posterior margins of coxae I. Peritremalia either absent or greatly reduced, not visible posterior to stigmata. Segmental chaetotaxy of coxae through tibiae of legs I to IV as given by Evans and Till (1965) for free-living dermanyssoid mites, except for presence of 11, rather than 9, setae on genu IV. Coxae II with small anterodorsal spur.

#### DESCRIPTION

The following description is given of the previously unknown male of *N. bispinosus*.

**MALE:** Small mite with general appearance of female; coxae with identical arrangement of spines and setae except that the proximal bifurcate spur of coxa I seen in females is reduced in male to a rectangular projection giving rise to proximal seta. Sternoventral plate separate from anal plate. Peritremata broad, short, extending only to mid-level of coxae III. Idiosoma 354  $\mu$  long, 226  $\mu$  wide. *Dorsum.* Dorsal plate

similar to that of female but differing in having shoulders broader over coxae II, including setae r3 and r4 within body of plate, and in including setae s2, which are lacking in female; 36 pairs setae on plate. Representative setal measurements: j1 - 17  $\mu$ , z1 - 6  $\mu$  (minute but larger than in female), j5 about 35  $\mu$ , J5 - 24  $\mu$ , Z5 - 37  $\mu$ . *Venter* (Fig. 65). Sternoventral plate 192  $\mu$  long, expanded slightly posterior to coxae IV with truncate posterior border about 12  $\mu$  from anal plate; usual 5 pairs setae in podosomal region, slim, each pair extending to or beyond bases of succeeding pair; 3 pairs similar setae in opisthosomal region; posterior pair on caudal margin of plate. Anal plate and metapodal platelets as in female. About 9 or 10 pairs of setae on unarmed opisthogaster. Peritremata broad, short, extending anterodorsally from stigmata, located laterally at level between coxae III and IV, to mid-level of coxae III. Peritremalia apparently absent. Parapodal platelets each a narrow apodeme bordering posterolateral margin of coxa IV. *Gnathosoma.* Chelicerae (Fig. 66) resembling generalized *Laelaps* type, with spermadactyl 30  $\mu$  long, grooved, of diminishing diameter apically and curved in gentle arc; movable digit a membranous, apically pointed lobe extending about  $\frac{1}{2}$  length of spermadactyl and partially fused with it; arthrodial processes short, setiform; fixed digit a short, poorly sclerotized lobe, pilus dentilis doubtfully present, indistinct. Deutosternal groove with 6 rows of 3 to 5 denticles each. In other features similar to female. *Legs.* As in female with exception as indicated above for coxae I.

#### Genus *Androlaelaps* Berlese

*Androlaelaps* Berlese, 1903:14.—Till 1963:14 [synonymy list].

Type Species: *Laelaps (Iphis) hermaphrodita* Berlese, 1887.

The concept of the genus *Androlaelaps* followed here is that advanced by Till (1963), whose work represents the most comprehensive recent review of the genus. Chaetotaxy of legs I to IV respectively for females of all Venezuelan species is as follows: trochanter - 6, 5, 5, 5; femur - 13, 11, 6, 6; genu - 13, 11, 9, 10; tibia - 13, 10, 8, 10. This agrees with the number considered normal for the genus by Till (loc. cit.).

#### Key to Species of Venezuelan *Androlaelaps* Females

1. Femur II with a stout, blunt spiniform seta on its ventral surface (*Androlaelaps* group) 2
- Femur II with only simple setae on its ventral surface (*Haemolaelaps* group) ..... 3

2. Posterior margin of sternal plate with median projection. Central setae of dorsal plate well developed, extending to or almost to, bases of next posterior setae. Pilus dentilis large, setiform ..... *A. projecta*, new species  
 Posterior margin of sternal plate concave medially. Central setae of dorsal plate delicate, short, not extending over  $\frac{1}{2}$  distance to bases of next posterior setae. Pilus dentilis short, fine ..... *A. foxi* Fonseca, 1959
3. Femur of leg I with anterodorsal seta (AD1) enlarged, spiniform, with length subequal to width of femur at level of seta. Setae j5 of dorsal plate minute, about  $\frac{1}{4}$  as long as distance from base of j5 to z5 ..... *A. rotundus* (Fonseca, 1936)  
 Femur of leg I with seta AD1 not enlarged or spiniform, or if somewhat enlarged length much less than width of femur at level of seta. Setae j5 of dorsal plate medium to long; length about  $\frac{1}{2}$  or more the distance from base of j5 to z5 ..... 4
4. Pilus dentilis slightly to broadly inflated basally ..... 5  
 Pilus dentilis a slender setiform ..... *A. casalis* (Berlese, 1887)
5. Proximal seta of coxa I inflated basally ..... *A. tuberosus*, new species  
 Proximal seta of coxa I a slim setiform ..... 6
6. Posterior part of dorsal plate with numerous accessory setae extending anterior to setae J1. Dorsal plate tapering posterior to coxae IV and ending in narrowly rounded apex ..... *A. hirsuta*, new species  
 Posterior part of dorsal plate without, or with a few accessory setae confined to region J2-J5. Dorsal plate broadly rounded posteriorly ..... 7
7. Pilus dentilis very slightly inflated basally. Setae of dorsal plate very delicate and short, particularly in central area ..... *A. pachyptilae* (Zumpt and Till, 1956)  
 Pilus dentilis broadly inflated basally. Setae of dorsal plate relatively coarse ..... *A. fahrenheitzi* (Berlese, 1911)

*Androlaelaps casalis* (Berlese)

*Iphis casalis* Berlese, 1887

*Androlaelaps casalis*, Till, 1963:23 [syn. list and redescription].

A single female of *A. casalis* was identified ex *Rattus rattus* collected at Santa Rosa, 1 km N and 2 km W Merida, Merida state, Venezuela, 1870 m elev., 24-V-66. This specimen agrees well with the description and figures of Till (1963).

Three collections containing 5 females of somewhat atypical *A. casalis* were recorded from *Saccopteryx bilineata* in Zulia and in T. F. Amazonas, and from *Sturnira lilium* in Barinas. These probably represent accidental host associations or erroneous collection records. The specimens have somewhat longer setae than normal on the dorsal plate and the sternal plate is atypically shallow for *A. casalis*.

*Androlaelaps fahrenheitzi* (Berlese)

*Haemolaelaps fahrenheitzi* Berlese, 1911:432.

*Laelaps glasgowi* Ewing, 1925:6.

*Haemolaelaps glasgowi*, Strandtmann, 1949:

343.—Samsinak, 1958:188 [syn. of *H. fahrenheitzi*].

*Androlaelaps glasgowi*, Till, 1963:40 [see syn. list].

A total of 6274 specimens of *A. fahrenheitzi* was identified from 1077 infested hosts collected in Venezuela; of these 5523 were females, 389 males and 361 nymphs. The most commonly and heavily infested hosts were *Zygodontomys brevicauda*, *Monodelphis brevicaudata*, *Sigmodon hispidus* and *Oryzomys albigularis*. Less commonly, but heavily infested were *Proechimys semispinosus*, *Heteromys anomalus*, *Sciurus granatensis*, *S. igniventris*, *O. minutus*, *O. concolor*, *Akodon urichi*, *Potos flavus* and *Aotus trivirgatus*. Occasional heavily infested hosts were *Marmosa robinsoni*, *Metachirus nudicaudatus*, *Cahromys philander*, *Rhipidomys macconnelli* and *Cryptotis thomasi*. Occasional hosts usually lightly infested were *M. nurina*, *Philander opossum*, *Echinomys armatus*, *Sigmodon alstoni*, *Neacomys tenuipes*, *O. bicolor*, *O. minutus*, *O. fulvescens*, *Nectomys squamipes*, *Agouti paca* and *Thomasomys laniger*. Hosts found infested 1 to a few times include *Mesomys hispidus*, *Didelphis azarae*, *M. dryas*, *M. cinerea*, *Bradypus infuscatus*, *R. venustus*, *Cavia porcellus*.

lus, *Sciurus gilvigularis*, *Holochilus braziliensis*, *O. capito*, *O. macconnelli*, *Nectomys alfari*, *Chilomys instans*, *Rattus norvegicus*, *Mus musculus*, *Alouatta seniculus*, *Cebus nigrivittatus*, *Lutra annectens*, various bats, a hummingbird and an owl.

Collections of the mite were made at elevations ranging from sea level to over 3400 m. The states (or district) in Venezuela from which collections were made are as follows, arranged in order of greatest to least frequency of collection: Monagas, Dto. Federal, Trujillo, T. F. Amazonas, Falcon, Carabobo, Lara, Merida, Aragua, Barinas, Bolivar, Miranda, Sucre, Yaracuy, Guarico, Zulia, Tachira, Apure and Nueva Esparta.

As pointed out by earlier authors notably Tipton et al. (1966), there is a wide range of variation in the species complex designated as *Androlaelaps fahrenheiti*. Essentially the entire range of variation depicted by Tipton et al. (loc. cit.) was encountered in Venezuela with several additional variants as well. Some of the variant forms differ from typical *A. fahrenheiti* by characteristics more striking than many used by Till (1963) in separating species of Ethiopian *Androlaelaps*. These may well prove to represent distinct species, but most of them have been grouped as forms of *A. fahrenheiti* for the present. Among the more striking variant forms are the following: 1) Ex *Metachirus nudicaudatus*, large robust, spiniform mites of the form depicted by Tipton et al. (1966, plates 22, 23); 2) Ex *Potos flavus* and *Aotus trivirgatus*, a form characterized by an apical as well as basal inflation of the pilus dentilis, a relatively long genitoventral plate extending to level of third pair of flanking setae, and with central setae of dorsal plate smaller than normal; 3) Ex *Echimyus armatus* and *Mesomys hispidus*, a form which keys out in Till's key (1963) to the *glasgowi-zulu* couplet but fits neither. Setae j5 of the dorsal plate are subequal to distance from j5 to z5 and the genitoventral plate is bordered by 3 pairs of flanking setae; 4) Ex *Cryptotis thomasi*, a small mite with relatively long and narrow genitoventral plate and absence of the dorsal seta pair px2.

#### *Androlaelaps foxi* Fonseca

*Androlaelaps foxi* Fonseca, 1959:180.

A single female of *A. foxi* was identified from *Akodon urichi* collected at Potrerito, Montalban, Carabobo, 1091 m elev., 8-XI-67.

The Venezuelan specimen agrees well in most respects with Fonseca's original description and figures of *A. foxi*. The idiosoma is some-

what narrower in relation to length, 758  $\mu$  by 484  $\mu$ , than described by Fonseca and the posterolateral setae of the S series on the dorsal plate are somewhat longer than indicated by his illustration. The dorsal plate has 39 pairs setae and appears to have 1 or 2 extra broken setae in the posterior central area. The ventral plates are as figured by Fonseca, but there is an obvious error in the latter's measurement of the length of the genitoventral plate, given as 310  $\mu$  from the genital setae to the posterior border. In the Venezuelan specimen, this measurement is 215  $\mu$  and the maximum width is 151  $\mu$ . Fonseca's measurement of length of the plate probably should read 210  $\mu$ , which from his illustration would be correct in comparison with the described width of 155  $\mu$  for the plate. Fonseca also erred in stating that leg I is enlarged when obviously he meant to state leg II is enlarged, as he correctly has illustrated. Chaetotaxy of legs I to IV respectively: trochanter - 6, 5, 5, 5; femur - 12, 11, 6, 6; genu - 13, 11, 9, 10; tibia - 13, 10, 8, 10.

#### *Androlaelaps hirsuta*, new species

(Fig. 67-72)

#### DIAGNOSIS

A robust, spiniform mite with hypertrichy of dorsal plate and unarmed integument. Female with coarsely inflated pilus dentilis, rectangular sternal plate and small genitoventral plate. Male with hypertrichy of holovenal plate.

#### DESCRIPTION

**FEMALE:** Idiosoma of gravid female broadly ovate, widest behind level of coxae IV and narrow anteriorly; 822  $\mu$  long by 606  $\mu$  wide. *Dorsum* (Fig. 68). Dorsal plate 710  $\mu$  long by 355  $\mu$  wide, with sides essentially parallel in area of coxae II to coxae IV thence rapidly narrowing posteriorly to narrowly rounded caudal margin, leaving wide margin of body uncovered; anterior tip of plate fused with peritremalia. Dorsal plate hypertrichous bearing an extra pair setae between j4 and z4 and about 12 extra setae in the central opisthosomal region between setae j6 and J5. Dorsal plate setae strong and many with barbs; representative setal lengths: j1 - 43  $\mu$ , j5 - 122  $\mu$ , J5 - 67  $\mu$ , Z5 - 116  $\mu$ ; distance between trichopores of j5 and z5 - 55  $\mu$ . Surface of dorsal plate reticulated and with usual pores; particularly prominent are 2 pairs of submarginal round spots associated with pores near setae S3 and S4. Unarmed portions of dorsal opisthosoma with many setae barbed but somewhat smaller than adjacent setae of dorsal plate, and extending from region of coxae II to posterior with exception of non-



setose area directly posterior to dorsal plate. *Venter* (Fig. 67). Sternal plate rectangular with concave lateral margins and slightly concave posterior margin as figured (Fig. 67); surface strongly reticulated; length at midline  $124\ \mu$ , width at level of setae II -  $156\ \mu$ ; setae I set on anterior margin,  $64\ \mu$  long with bases separated by  $92\ \mu$ ; setae III  $86\ \mu$  long; metasternal setae subequal to first sternal setae. Presternal area strongly reticulate and with pair of pores subtending base of tritosternum. Genitoventral plate small, lingulate, with coarsely reticulate surface,  $126\ \mu$  long from anterior margin of genital setae trichopores to posterior margin;  $112\ \mu$  wide at widest point just anterior to first pair of flanking setae;  $97\ \mu$  wide at level of genital setae; latter are  $103\ \mu$  long and set on lateral margins of plate. Anal plate narrowly pyriform  $128\ \mu$  long by  $98\ \mu$  wide. Adanal setae  $58\ \mu$  long arising just cephalad of posterior margin of anus and extending just past base of postanal seta; latter  $83\ \mu$  long. Metapodal platelets small, about twice as long as wide. Unarmed opisthogaster with about 30 pairs of strictly ventral setae including 2 pairs flanking genitoventral plate; setae toward margins barbed; many setae on margins as in Fig. 67. Peritremata extend to mid-level of coxae I, moving from ventral to dorsal side at level between coxae I and II. Peritremalia well developed, extending well posterior to stigmata but not fused with parapodal plates. *Gnathosoma* (Fig. 69 and 70). Digits of chelicerae  $45\ \mu$  long; movable digit with curved pointed tip and 2 teeth, fixed digit apparently lacking teeth but with large pilus dentilis broadly inflated basally and slightly inflated distally in coarse, setiform, recurved tip. Arthrodial processes at base of movable digit short, setiform, subequal. Deutosternal groove with 6 rows of 3 to 4 denticles each. Inner hypostomal setae  $56\ \mu$  long extending almost to bases of shorter gnathosomal setae. *Legs*. Coxal setae setiform with slight thickening of posterior seta of coxa III. Leg chaetotaxy normal for genus, tibia III with 8 setae; genu IV with 10 setae. All setae of tarsus II pointed. Length of tarsus IV almost 6 times its width at base.

**MALE:** Idiosoma narrowly oval with slight shoulders over coxae II;  $532\ \mu$  long by  $317\ \mu$  wide. *Dorsum*. Dorsal plate  $532\ \mu$  long; lateral borders indistinct but appear to extend almost to margins of idiosoma; plate chaetotaxy as in female with possible exception of lateral marginal areas; posterior setae and marginals barbed as in female. *Venter* (Fig. 71). Holoventral plate with 36 setae; plate shape as in *A. fahrenheitzi*; anterior pair of setae extend

slightly beyond bases of second pair. Adanal setae arising at mid-level of anus,  $37\ \mu$  long; postanal setae  $60\ \mu$  long. Peritremata and peritremalia as in female. *Gnathosoma*. Chelicerae (Fig. 72) similar to those of *A. fahrenheitzi* with elongate, tubular spermadactyl coiled terminally in  $\frac{1}{2}$  to  $1\frac{1}{2}$  revolutions and with movable digit a transparent slim lobe about  $\frac{1}{3}$  length of spermadactyl; reduced fixed digit bearing a small, inflated pilus dentilis; arthrodial processes in form of a row of equal "microsetae" subtending base of movable chela. *Legs*. As described for female.

**DEUTONYMPH:** Dorsal plate hypertrichous; chaetotaxy as in female. Dorsal margins of body heavily setose. Sternal plate bearing usual 4 pairs setae and a fifth pair just off the posterior margin; anterior pair short, not reaching bases of second pair. Presternal area with strong transverse reticular pattern and appearing continuous with sternal plate. Anal plate as in female. Unarmed opisthogaster with about 22 pairs strictly ventral setae plus many marginal setae. Peritremata as in female.

**PROTONYMPH:** With 11 pairs setae on podonotal plate and 8 pairs on opisthonotal plate with 6 pairs on unarmed cuticula between the plates. Sternal plate indistinct but with usual 3 pairs setae and 2 pairs pores in medial area between coxae II and III. A fourth pair of minute setae between coxae IV. Anal plate as in female. Four pairs well developed, strictly ventral setae on unarmed opisthogaster. Marginal setae few and barbed. Chelicerae as in female.

**TYPE DATA:** Female holotype and 4 female paratypes ex *Marmosa fuscata* Thomas (SVP 13950), 1335 m elev., La Laguna, 2 km N and 4 km W Caripe, Monagas, Venezuela, collected 6-VII-67 by the Norman Peterson team. Allotype (SVP 14090) with same data as type except at 1338 m elev., and collected 9-VII-67. Additional paratypes are 5 females ex 2 *M. fuscata* at the same locality as the holotype; 6 females ex 1 *M. fuscata* near San Agustín 2 km N and 4 km W Caripe in Monagas; 3 females ex 3 *M. fuscata* collected 5 km NNE Caracas, Dto. Federal at 2104 to 2124 m elev.; 1 male, 1 female, 3 deutonymphs and 2 protonymphs ex 2 *M. fuscata* at La Copa, 4 km NW Montalban, Carabobo; 1 female and 5 males ex *M. fuscata* at La Copa, Carabobo at 1513 m elev.

Collections of *A. hirsuta* in addition to the type series are as follows: 43 females, 4 males, 4 deutonymphs and 6 protonymphs ex 12 *M. fuscata* in the states of Carabobo, Monagas, Miranda, Tachira and Dto. Fed-



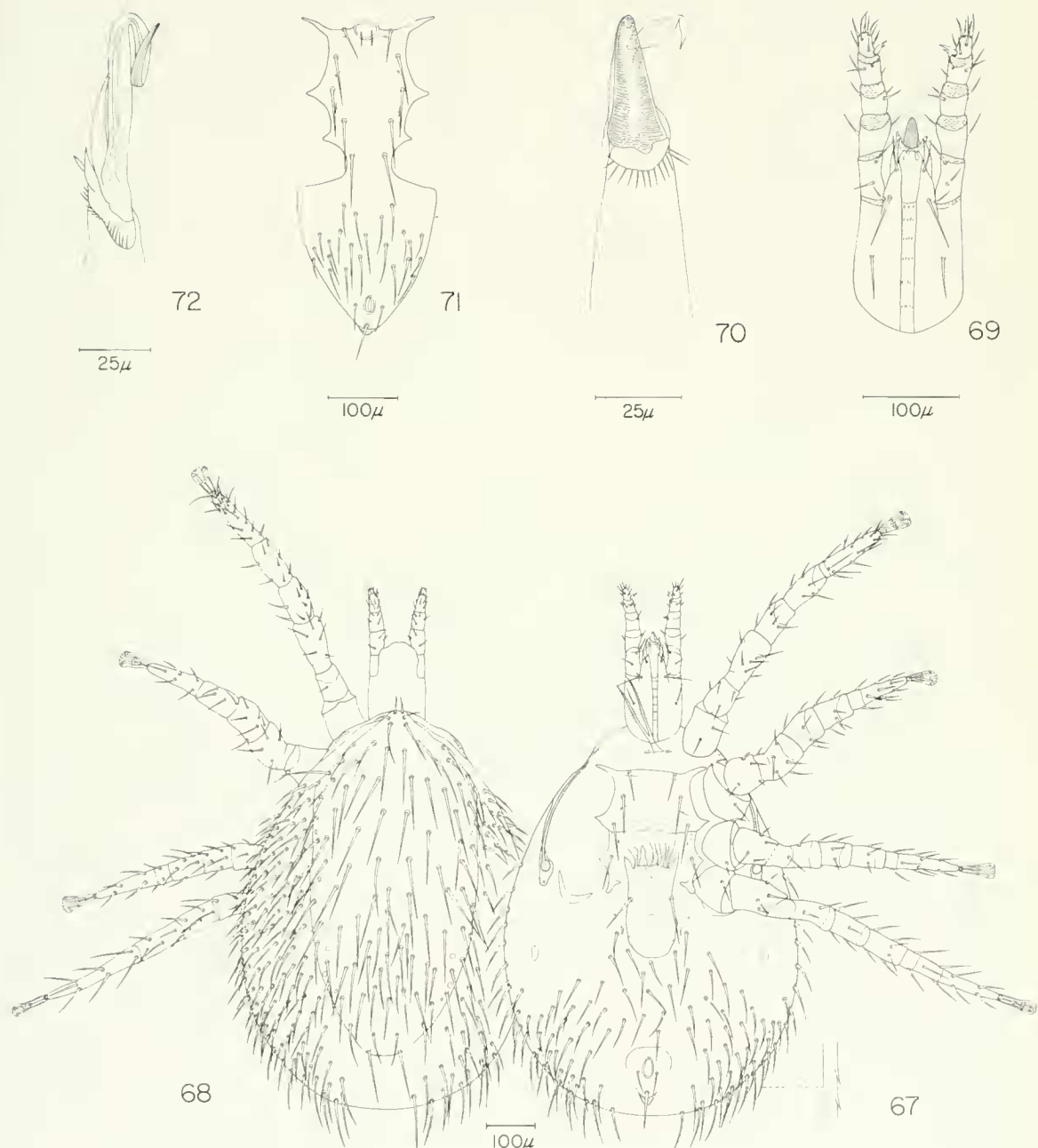


Fig. 67-72. *Androlaelaps hirsuta*, new species, from *Marmosa fuscata*, Monagas state: 67, ventral view of female; 68, dorsal view of female; 69, gnathosoma of female; 70, chelicera of female; 71, holovenal plate of male; 72, chelicera of male.

eral at elevations from 1160 to 2405 m; 11 females, 4 deutonymphs and 3 protonymphs ex 2 *M. fuscata* in Carabobo at 1513 m elev.; 1 female ex *Rattus rattus* in Carabobo at 1810 m; 2 females ex 1 *Zygodontomys brevicauda* in Monagas at 18 m; 2 females ex 1 *Proechimys* sp. in Falcon; 1 male ex *Vampyressa pusilla* in Carabobo at 1810 m; 6 females, 2 males and 1 deutonymph ex *Phyllotoma discolor* in Trujillo at 90 m.

*Androlaelaps pachyptilae* (Zumpt and Till)

*Haemolaelaps pachyptilae* Zumpt and Till, 1956: 285.

*Androlaelaps pachyptilae*, Till, 1963:62.

A single collection of 6 females was identified as *A. pachyptilae* ex a "bird" collected at San Agustin, 3 km N and 4 km W Caripe, Monagas, Venezuela, 10-VII-67.

The specimens agree well with Till's 1963 redescription and figures of this species. It is a small species with small, delicate setae in the central area of the dorsal plate, genitoventral plate widest at level of first pair flanking setae and widely separated from anal plate, and pilus dentilis very slightly inflated basally.

*Androlaelaps projecta*, new species

(Fig. 73-76)

DIAGNOSIS OF FEMALE

With general facies of *A. zuluensis* Zumpt, with genitoventral plate extending almost to anal plate. Sternal plate with irregular posterior margin with median projection. Pilus dentilis well developed, prominent, setiform. Ventral stout spines well developed on leg II.

DESCRIPTION

**FEMALE:** *Dorsum* (Fig. 74). Idiosoma 564 to 607  $\mu$  long by 371 to 387  $\mu$  wide. Dorsal plate 537 to 592  $\mu$  long by 349 to 376  $\mu$  wide with sides almost straight at mid-level and covering most of idiosoma; 39 pairs simple setae plus 2 unpaired submedian opisthionotal setae distributed as in Fig. 74; most setae extend to, or almost to, bases of next posterior setae; representative setal lengths: j1 - 34  $\mu$ , j5 - 49  $\mu$  in paratype, J5 - 43  $\mu$  (49  $\mu$  in paratype), Z5 - 67  $\mu$  (79  $\mu$  in paratype). Distance between bases of setae j5 and Z5 - 55  $\mu$ . Surface of dorsal plate lightly reticulated. *Venter* (Fig. 73). Tritosternum with base 23  $\mu$  long, lacinia 75  $\mu$ , fused for basal 24  $\mu$ . Sternal plate 104  $\mu$  long on midline by 113  $\mu$  wide at level of setae II; anterior margin slightly concave, lateral margins deeply concave, posterior margin with median projection

flanked by pair semicircular concavities and broadly angulate posterolateral corners; with usual 3 pairs of setae and 2 pairs of pores as illustrated; setae I arise on anterior margin, 43  $\mu$  long and bases separated by 62  $\mu$ ; setae III 60  $\mu$  long with bases separated by 114  $\mu$ . Endopodal plates angulate between coxae III and IV extending in area anteriorly and posteriorly around inner aspects of coxae, appearing fused anteriorly with posterolateral margins of sternal plate. Metasternal setae situated in inner angle of endopodal plates, slightly smaller than third pair sternal setae. Genitoventral plate flask-shaped with truncate caudal margin, extending almost to anal plate, 210  $\mu$  long from anterior margins of genital setae trichopores to posterior margin, 161  $\mu$  greatest width in region of first to second pair of flanking setae, 116  $\mu$  wide at level of genital setae, which are 49  $\mu$  long. Anal plate about as long as wide (98 to 100  $\mu$ ) with adanal setae arising at posterior level of anus and about 43 to 49  $\mu$  long; postanal seta 31  $\mu$  long in paratype (missing in type). Chaetotaxy of opisthogaster as figured; 2 pairs setae flanking midlateral margins of genitoventral plate and third pair just anterior to posterolateral margins of plate; total of 7 pairs setae on strictly ventral portion of unarmed opisthogaster and 6 pairs on margins. Metapodal platelets irregular, rodlike, about 30  $\mu$  long. Peritremata extend to anterior midlevel of coxae I. Peritremalia extending well posterior to stigmata, each with a terminal and a subterminal pore, separate from parapodal platelets of coxae IV. *Gnathosoma*. Tectum capituli membranous, without irregular or setiform projections. Chelicerae (Fig. 76) with fixed digit bearing prominent slender setiform pilus dentilis, but orientation obscures dentition if any; movable digit with 2 teeth and recurved pointed tip. Gnathosomal setae 27  $\mu$  long; inner hypostomals 49  $\mu$ , slightly longer than distal hypostomals; outer hypostomals very short. Deutosternal groove with 6 rows of 3 to 4 denticles each. Corniculi long, slim, well sclerotized. Labrum-epipharynx elongate, with longitudinal grooves ventrally. Pedipalp (2-5-6-14) with 2 tined apotele. *Legs*. Chaetotaxy of legs I to IV respectively: trochanter - 6, 5, 5, 5; femur - 13, 11, 6, 6; genu - 13, 11, 9, 10; tibia - 13, 10, 8, 10. Leg II (Fig. 75) with seta av1 of femur modified as a stout, blunt spine, slightly curved apically, 28  $\mu$  long (34  $\mu$  in paratype) by 14  $\mu$  wide at base, about  $\frac{1}{2}$  or more as long as width of femur at base; seta av1 of genu II modified as a smaller spine; seta av1 of tibia II modified as a pointed spine swollen and angulate basally. Tarsus II with setae av1 to 3 thickened; all tarsal setae pointed.

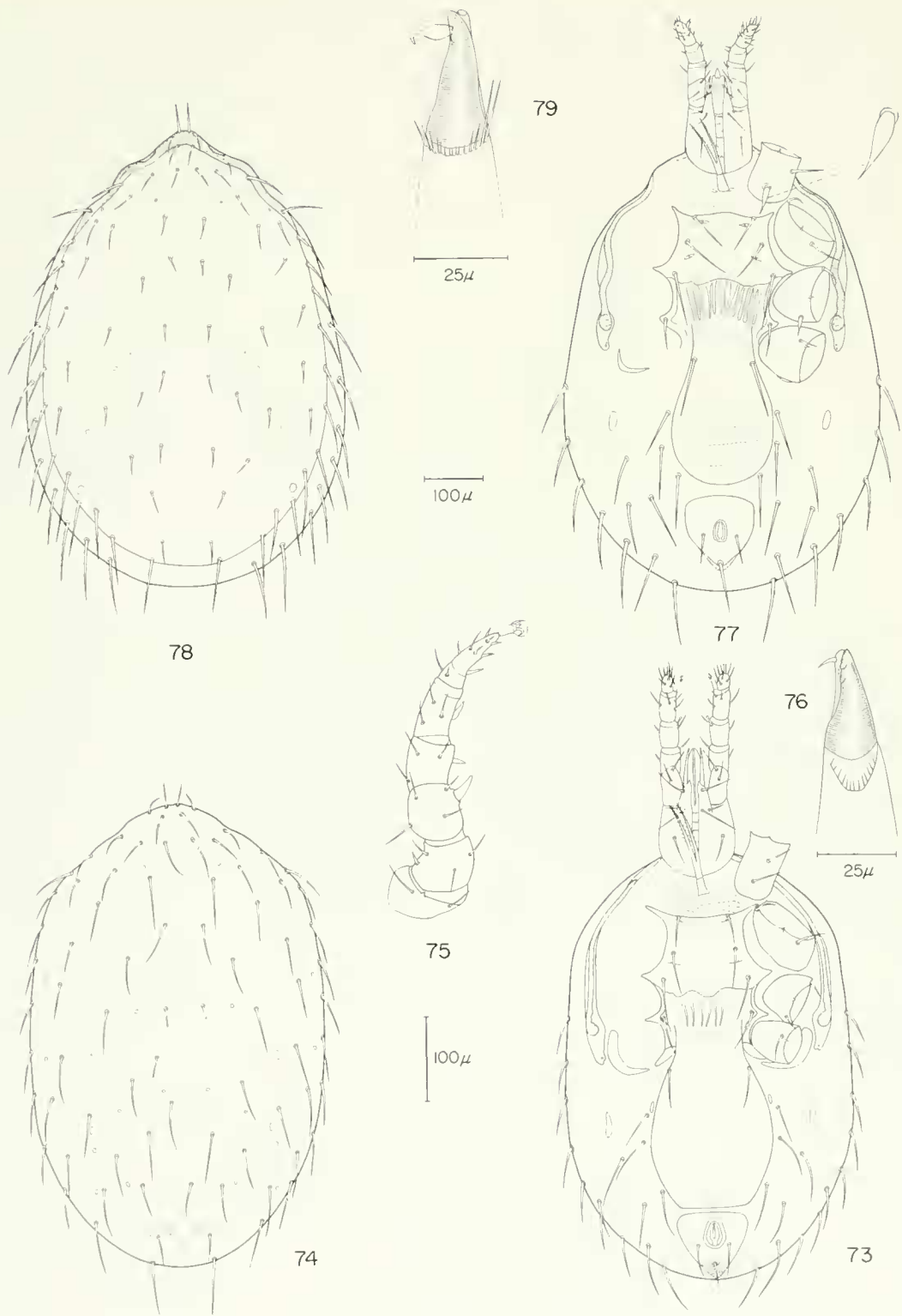


Fig. 73-79. 73-76, *Androlaelaps projecta*, new species, female from *Sciurus granatensis*: 73, ventral view; 74, dorsal plate; 75, ventral view of leg II; 76, chelicera. 77-79, *Androlaelaps tuberosans*, new species, female from *Marmosa cinerea*: 77, ventral view; 78, dorsal view of idiosoma; 79, chelicera.

*A. projecta* is known only from the adult females.

TYPE DATA: Female holotype and 1 female paratype ex *Sciurus granatensis* Humboldt (SVP 34089), La Vega del Río Santo Domingo, 2 km SW Altamira, Barinas, collected 2-1-68. Other female paratypes are: 1 ex *Zygodontomys brevicauda* and 1 ex *Heteromys anomalus* from Hda. Socopito, 20 km S and 98 km E Maracaibo, Falcon; 1 ex "bird" from San Agustín, 3 km N and 4 km W Caripe, Monagas. In addition to the type series, 4 specimens were identified as this species ex an heteropteran, *Blissus* sp. near *insularis* Barber, from Maracaibo, collected by A. Nontial on 20-1-70, and forwarded through the courtesy of Dr. José R. Labrador S. of the Universidad del Zulia.

*A. projecta* resembles *A. setosus* Fox, 1946, which differs in being a larger mite with much longer dorsal, as well as most of the ventral, setae, and in having a sternal plate with a concave posterior margin; additionally there are 14 or 15 pairs of setae on the unarmed portion of the opisthogaster in *A. setosus*.

*A. projecta* differs from *A. foxi* Fonseca, 1959 in that the latter has a sternal plate with concave posterior margin, has very short setae on the central portion of the dorsal plate and has a short, fine pilus dentilis on the fixed digit of the chelicera.

*A. projecta* differs from the closely related *A. zuluensis* Zumpt, 1950 in that the latter has a sternal plate with posterior margin straight to slightly irregular, has a relatively smaller ventral spur on femur II and more numerous setae on the unarmed portion of the opisthogaster.

#### *Androlaelaps rotundus* (Fonseca)

*Eubrachylaeps rotundus* Fonseca, 1936a:20.—1959:163 [redescribed and figured].—Furman and Tipton, 1961:171 [Venezuelan records].

A total of 769 female and 3 male specimens of *A. rotundus* was identified from 95 infested hosts collected in Venezuela. From 70 specimens of the common host, *Akodon urichi*, were taken 716 females and 3 males. Occasional hosts found positive 2 to 6 times were *Oryzomys albicularis*, *O. concolor*, *O. minutus* and *Heteromys anomalus*. Single collections of 1 to 16 mites were taken from *Monodelphis brevicaudata*, *Cavia porcellus*, *Zygodontomys brevicauda*, *Sigmodon hispidus*, *Rattus norvegicus*, *R. rattus*, "bird" and several species of bats.

Hosts infested with *A. rotundus* were taken at elevations ranging from 90 to 3260 m, with the majority collected above 1000 m. States (or district) in Venezuela from which collections were made are as follows, arranged in order of greatest to least frequency: Dto. Federal, Aragua, Carabobo, T. F. Amazonas, Falcon, Monagas, Merida, Sucre, Guarico, Miranda, Tachira, Trujillo.

Specimens studied from Venezuela fall within the range of variations reported by Fonseca (1959).

#### *Androlaelaps tuberosus*, new species

(Fig. 77-79)

#### DIAGNOSIS OF FEMALE

Of medium size for genus, with proximal seta of coxa I inflated basally, with large genitoventral plate flanked by 3 pairs setae, with short, delicate central setae on dorsal plate and with pilus dentilis broadly inflated basally and narrowly inflated distally.

#### DESCRIPTION

FEMALE: Idiosoma of gravid female broadly ovate, somewhat narrowed anteriorly, with slight shoulders over coxae I and coxae II; 768  $\mu$  long by 531  $\mu$  wide. *Dorsum* (Fig. 78). Dorsal plate reticulate with anterolateral margins strongly sclerotized, 720  $\mu$  long by greatest width of 478  $\mu$  just behind level of coxae IV, leaving narrow lateral margins of idiosoma exposed posterior to coxae II; exposed margins broader posteriorly. Dorsal plate with 39 pairs setae; all but marginal setae very short and delicate. Representative setal lengths: j1 - 43  $\mu$ , j5 - 23  $\mu$ , J5 - 32  $\mu$ , Z5 - 98  $\mu$ . Distance between bases of setae j5 and z5 - 54  $\mu$ . Marginal setae of dorsal plate and idiosoma barbed. Unarmed dorsal margin with single row of strong, minutely barbed setae. *Venter* (Fig. 77). Sternal plate subrectangular, reticulate, 107  $\mu$  long on midline by 153  $\mu$  wide at level of second pair setae; setae I 60  $\mu$  long extending almost to level of second pair of pores and with bases separated by 92  $\mu$ ; setae III 85  $\mu$  long and with bases separated by 161  $\mu$ ; metasternal setae relatively small, 43  $\mu$  long. Genitoventral plate large, flask shaped, with broadly rounded caudal margin; 193  $\mu$  long from level of genital setae bases to posterior margin, flanked by 3 pairs of setae and almost touching anal plate; width at level of genital setae 116  $\mu$ ; maximum width between first and second flanking setae 160  $\mu$ . Genital setae 86  $\mu$  long. Anal plate slightly longer than broad, 128  $\mu$  long and 122  $\mu$  wide; broadest anteriorly, with anus placed 40  $\mu$  behind slightly convex plate margin; adanal setae at level of



posterior margin of anus, 55  $\mu$  long, extending to base of postanal seta; latter 77  $\mu$  long. Unarmed opisthogaster with 9 to 10 pairs ventral setae and a few strong, minutely barbed marginal setae. Metapodal platelets irregularly oval, about 30 by 17  $\mu$ . Peritremata extend to level of anterior  $\frac{1}{3}$  of coxae I proceeding from ventral to dorsal side over coxae II. Peritremalia extending normally behind stigmata and widely separate from parapodal plates. *Gnathosoma*. Chelae 40  $\mu$  long, movable chela with curved, pointed tip and with 2 teeth, but orientation prevents exact description. Pilus dentilis of fixed digit large, broadly inflated basally, sharply constricted at apical  $\frac{1}{3}$  with distal  $\frac{1}{3}$  a coarse, slightly inflated sickle (Fig. 79). Setiform arthrodial processes at base of movable digit varying from short to almost  $\frac{1}{2}$  length of movable digit. Deutosternal groove with 6 rows of 3 to 6 denticles each. Inner hypostomal setae 49  $\mu$  long reaching to base of gnathosomal setae and longer than the latter; gnathosomal and hypostomal setae all delicate, setiform. *Legs*. Coxa

I with proximal seta inflated basally, acuminate, 43  $\mu$  long by 8  $\mu$  wide; distal seta slim, setiform, 50  $\mu$  long; posterior seta of coxa III spiniform; other coxal setae setiform. Leg chaetotaxy normal; tibia III with 8 setae; genu IV with 10 setae. Tarsus IV 5 times longer than width at base. Tarsus II with some setae rather spiniform, but all are sharply pointed.

*Androlaelaps tuberans* is known only from the females.

TYPE DATA: Holotype and 1 paratype ex *Marmosa cinerea* (Temminck) (SVP 15761), Belén, Río Cunucunuma, T. F. Amazonas, Venezuela, 150 m elev., 17-I-67, collected by the Tuttle team. Four additional paratypes have the same host and locality data as the type but were collected 12-II-67. Six paratypes were taken from 2 *M. cinerea* and 2 paratypes from *Proechimys* sp., 130 m elev., Capibara, Casiquiare Canal, T. F. Amazonas, 29 and 31-V-67, collected by the Tuttle team.

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